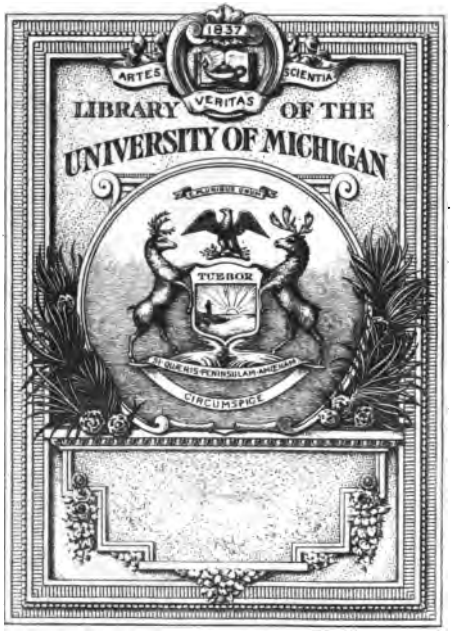
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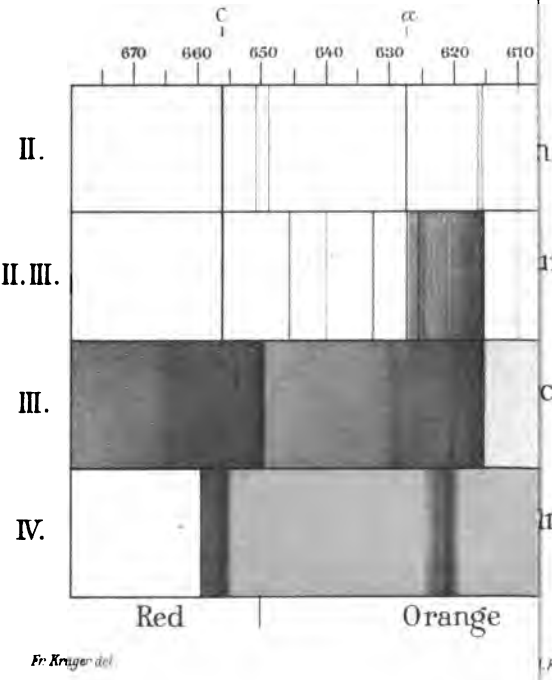

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From

CELESTIAL OBJECTS

FOR COMMON TELESCOPES

BY

THE REV. T. W. WEBB, M.A., F.R.A.S.

LATE VICAR OF HARDWICK, HEREFORDSHIRE

FIFTH EDITION, REVISED AND GREATLY ENLARGED (1894)

BY REV. T. E. ESPIN, M.A., F.R.A.S.

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1907

Many things, deemed invisible to secondary instruments are plain enough to one who 'knows how to see them' SMYTH

When an object is once discovered by a superior power, an inferior one will suffice to see it afterwards SIR W. HERSCHEL

Inertia mors est philosophiæ—vivamus nos et exerceamur KEPLER

Pulchra sunt omnia faciente Te, et ecce Tu inenarrabiliter pulchrior, qui fecisti omnia S. AUGUSTINE

Sic enim magnalia sapientiæ suæ decoravit Is, qui est ante sæculum et usque in sæculum; nihil redundat, nihil deficit, nec locus est censuræ cujusquam Quam desiderabilis operæ ejus! * * * * * et quis saturabitur videns gloriam eorum? KEPLER

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PART III. THE STARRY HEAVENS.

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PART III.

THE STARRY HEAVENS.

Lift up your eyes on high, and behold Who hath created these things, that bringeth out their host by number: He calleth them all by names by the greatness of His might, for that He is strong in power; not one faileth.—Isa. xl. 26.

DOUBLE STARS, CLUSTERS, AND NEBULÆ.

If the Solar System had comprised in itself the whole material creation, it would alone have abundantly sufficed to declare the glory of God, and in our brief review of its greatness and its wonder we have seen enough to awaken the most impressive thoughts of His power and wisdom. But that system is but as a single drop in the ocean. What boundary may be set to creation we know not, but we can trace it sufficiently to perceive that, as far as our senses are concerned, it cannot be distinguished from absolute infinity: and in leaving our Sun and his attendants in the background, we are only approaching more amazing regions, and fresh scenes will open upon us of inexpressible and awful grandeur. We are now to contemplate not one Sun, but thousands and myriads: not a planetary system of subordinate globes, but aggregations of Suns; pairs, groups, galaxies of Suns—'the host of heaven'—all independent in unborrowed splendour,

yet many evidently, and all by clear implication, bound together by the same universal law which keeps the pebble in its place upon the surface of the earth, and guides the falling drop of the shower, or the mist of the cataract. Many of these Suns may probably be smaller or dimmer than our own, yet others unquestionably far surpass his splendour; while as to distance, their remoteness is so inconceivable that light itself, flying with a speed which would encircle the Earth nearly 8 times in one second, only shows them to us as they formerly were, some years, others centuries, others perhaps whole ages back, even in the first dawn of creation. Here is indeed a field where enterprise cannot be thrown away, nor perseverance fail of its reward.

We must, however, remember that, though they are Suns which we are contemplating, and though the mere aspect of some of them in a large telescope well bears out the assertion,[1] yet a great proportion are diminished by distance to the minutest points of light, and can only be distinctly seen under favourable circumstances. We cannot therefore expect uniform success; in fact, the more delicate objects of stellar astronomy are not only among the severest tests of the telescope and the eye, but are peculiarly liable to be affected by atmospheric indistinctness, and require the most propitious skies. The cautions suggested in Part I. will be especially applicable here.

An original investigation of all the objects worthy of notice, even in a popular sense, in the starry heavens, would

[1] The approach of Sirius to the field of H 40-ft. reflector is said to have been ushered in by a dawning light, and its actual entrance to have been almost intolerable to the eye: yet the 4-ft. mirror was far from good. What must be the blaze of this star in the Earl of Rosse's telescope, with a speculum of 6 ft., of much higher reflective power!

have been the attempt of a lifetime, rather than of such occasional hours of leisure as I could command: an unverified selection, on paper, from a standard list formed with a very different design, would have been an easy, but not a satisfactory task: a middle course has therefore been preferred. All such of the 850 Double Stars and Nebulæ of Vice-Admiral Smyth's Bedford Catalogue as my $3\frac{7}{10}$-in. of aperture could be expected to reach, were examined in succession,[1] and those only retained which seemed to possess sufficient general as well as scientific interest, and might serve as specimens of the universal profusion: but as in such a review a number of other objects, beautiful to the popular eye, though unimportant perhaps to the professed astronomer, presented themselves unsought, many of these have been added to the list, as well as many from Struve's 'Mensuræ Micrometricæ,' and other quarters. Such was the plan of the preceding edition. But the seven years that have since elapsed have brought such an unprecedented increase of observers and instruments competent to deal with a more difficult class of objects, that it has been thought desirable, without abandoning the original design or title of the work, to enlarge it in the hope of greater usefulness. An addition has accordingly been made of about 1080 pairs from Lord Lindsay's very valuable Summary of the Dorpat Catalogue, together with 70 from that of Poulkova, and many from the lists of Burnham.[2]

[1] In the present edition the colours taken from Mr. Webb's Manuscript Observation are inserted after those of Σ, and the date is added thus:—yw., blsh., '49.

[2] In the present edition an attempt has been made to complete the list of Double Stars to a certain magnitude. All Double Stars whose primary is above 6·5 (according to the authorities whence the information is taken), and their distances less than 20″ have been

The series comprises many notes on colour and magnitude, the permitted publication of which demands special acknowledgment. These may all in their way be helpful to the student. But, if diligent in the employment of opportunities, he will soon find that, as these pages are but a very limited selection from works of the highest character, so those in turn are powerless to represent even what we can reach of the unspeakable richness and grandeur of the firmament. The Dorpat Catalogue of 3062 double stars was a wonder of accuracy and perseverance: but h. considered that it included less than $\frac{1}{3}$ of the pairs that were obvious in his sweeping: and a large proportion of these are unrecorded still. And yet the sole, or even the chief attraction of the sidereal heavens does not lie in the juxtaposition of two stars, possibly merely accidental, and frequently beyond the reach of any but the most powerful instruments. Many parts of the sky, especially the crowded fields of the Galaxy, are full of most interesting and beautiful groups and combinations, of which little or no mention can be found. The attention of the professed astronomer is usually directed into some definite channel, and he has little leisure, and sometimes perhaps not much taste, for that general and indefinite sweeping and 'star-gazing,' which to humbler students becomes a source of boundless delight and wonder. It need not be said that the wishes of the latter class have been chiefly considered in the following pages, though it is hoped they may be of occasional use in other ways.

From a pressure of various employments, the interval since the first appearance of this little work has not added much original matter to the following catalogue. But it is to be hoped that some zealous lover of this great display of

added as far as they could be found in the great mass of Double Star Observations now published.

the glory of the Creator will carry out the author's idea, and study the whole visible heavens from what might be termed a picturesque point of view. This would involve nothing more than a sufficiency of optical power, of leisure, and of patience bringing with it its abundant reward. By a suitably arranged plan, every part of the sky might be swept over in succession, and the principal instances of intensity of colour, or elegance or singularity of grouping having been noted, the materials would be prepared for a most interesting work—a *Handbook of the Wonders and Beauties of the Starry Heavens.*

A well-adjusted equatorial telescope will readily find anything in the following list from the position there given; otherwise, recourse must be had to a good globe or map. The larger Star-Maps of the Society for the Diffusion of Useful Knowledge were very carefully compiled and of much value in their day, notwithstanding a most inconvenient amount of distortion towards the sides and corners; but in this respect, though not as regards the minute stars, they are much inferior to the Atlases of Proctor; the smaller of these was specially intended as a companion to the present work, but does not contain the additions made in this impression.[1] The stars, clusters, and nebulæ in the following pages are divided into constellations, which are arranged alphabetically: the boundaries of Heis, in his 'Atlas Cœlestis,'

[1] Cottam's 'Charts of the constellations' are admirably suited as a companion Atlas to this work, for objects visible in England. The larger maps (30 × 22 ins.) easily allow of any additions being inserted, but many of the new objects in the present edition will be found there already. The smaller or popular edition has been reduced from the larger by photography. The constellations are delineated separately, and there is an excellent introduction with three key-maps.

have been followed; but difficulties have often arisen as to objects close on the borders, and they may have been occasionally assigned to a wrong constellation.

Pairs whose connection is ascertained are termed 'binary.' It should be observed that where change is demonstrated it does not necessarily infer binarity, as it may arise from proper motion in one or both components, and binarity is proved by common proper motion where no other change can be detected. In many cases where binarity has been inferred, later measures are given instead of 'Binary' or 'Moving.' The Periods of Binaries are for the most part taken from information supplied by Mr. Gore.

I am indebted to the kindness of G. Knott, Esq., for the following table of the equivalent telescopic star-magnitudes of Smyth, Struve (Σ), Herschel II., and Argelander. It is the result of direct comparison of their respective values of the same objects: those of Argelander being carried below 9·5 m^{s}. by inference.

Sm.	Σ	h.	A.
6	5·7	6·4	5·9
6·5	6·3	7·0	6·4
7	6·5	7·4	6·8
7·5	6·9	7·8	7·5
8	7·4	8·2	8·0
8·5	7·9	8·8	8·6
9	8·3	9·5	9·0
9·5	8·9	10·1	9·4
10	9·3	10·4	9·4
11	10·0	11·3	10·0
12	10·4	11·7	10·6
13	10·7	12·5	11·2
14	10·9	13·3	11·8
15	10·9	14·5	12·4
16	10·9	15·9	13·0

A subsequently published collation by Herschel II. of his own magnitudes with those of Σ will form an interesting addition.[1]

[1] The magnitudes of De., often quoted in the following pages,

Σ	h.	Σ	h.	Σ	h.	Σ	h.
2·60	3	6·40	7	9·30	11	10·87	15
3·10	3·5	6·85	7·5	9·60	11·5	11·13	19
3·60	4	7·30	8	9·80	12	18·38	17
4·10	4·5	7·70	8·5	10·00	12·5	11·61	18
4·60	5	8·10	9	10·18	13	11·82	19
5·05	5·5	8·50	9·5	10·36	13·5	12·00	20
5·50	6	8·80	10	10·54	14		
5·95	6·5	9·10	10·5	10·71	14·5		

The whole subject of magnitudes is, however, in an uncertain and unsatisfactory state; an assertion which will be borne out by a collation of the best authorities with each other, with themselves on different occasions, and with the sky: and it is with pleasure that we find that stellar photometry is being seriously taken in hand with the best appliances at the Harvard Observatory.[1]

The *range of visibility* is limited not only by the light of the instrument and the sensitiveness of the eye, but to an extent that could not have been anticipated, by the condition of the air. Burnham has remarked that 'an object-glass of 6 in. one night will show the companion to Sirius perfectly: on the next night, just as good in every respect, so far as one can tell with the unaided eye, the largest telescope in the world will show no more trace of the small star than if it had been blotted out of existence.' Burnham, Ward, Sadler, and others possess a sight capable of detecting very

down to 10·3 practically correspond with Σ, but Σ 11·2 = De. 11·0 and Σ 12 = De. 11·7. The magnitudes of OΣ, and De. are nearly identical. Σ 12, however, equals OΣ 11·35. β scale = H.'s up to '78, afterwards = Σ. A. in his 'Uranometria Nova' and Heis are not subdivided decimally. Pickering by photometric measurements finds that while the brighter stars are correctly rated by A., the fainter stars are overrated so that 9·2 A. = 9·6, 9·5 A. = 10·5.

[1] Since these words were written the 'Harvard Photometry' has been published. This great work contains measures of magnitude of all the bright stars visible at Harvard, compared with the Pole Star.

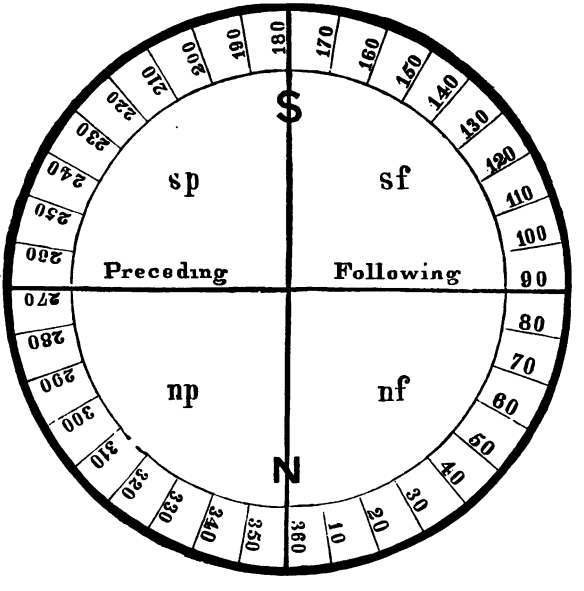
minute points with small optical means, but with an eye and telescope of average quality my experience leads me to believe that the range of a $3\frac{7}{10}$-in. object-glass will terminate among 11 m^{s}. stars (of Smyth's scale), though from some unknown cause—possibly, as Smyth suggests, peculiarity of hue—smaller ones are sometimes to be caught. Where I have ventured to note any discrepancy as to magnitude, it has been with a view to assist in detecting variations of light: Schr. suggested, and Humboldt is of his opinion, that variability may be the inseparable condition of all light, and the evidence of its probability is continually on the increase. As to estimates of *colour* there is also great uncertainty, arising from the differences of telescopes and eyes, and even of the states of the same eye: still there are limits of disagreement, and it is desirable to fix them, as there seems reason to believe that these colours may change: where there is any such suspicion, comparisons should be multiplied, and their circumstances varied. As this is an interesting inquiry, and one suited to amateurs, I had intended to insert many more discrepancies between Smyth's colours and those of other observers; but I ultimately found that a very large proportion may be reasonably referred to the causes just mentioned, and included in the wide margin of those individual peculiarities of perception or judgment which astronomers term 'personal equation,' so that a few only have been retained, either where there may be some suspicion of real alteration, or as specimens of the differences to be expected in the inquiry. I have ventured to pass by, from their obvious peculiarity, Sestini's colours, which caused a re-examination by Smyth, published in his learned and elegant 'Ædes Hartwellianæ,' but I have inserted some by the eminent observer Dembowski, as worthy of the highest confidence; and, in the present edition, many by modern

observers. The colours of all the objects in my list, as well as many others, were carefully compared with the Bedford Catalogue: my original instrument and experience were far inferior,[1] and my eye usually biased by previous knowledge, so that I was little qualified for such a scrutiny; but with a great preponderance of agreement or acquiescence, a few discrepancies were noted: dates are added, as the idea of periodical changes of tint involves no impossibility, and has been strongly advocated by Piazzi Smyth. The subject is a curious one, and it would be worth while to record from time to time the colours not only of associated but single stars as they may come under our notice. The *angles of position*, which measure the inclination to the meridian, of the line joining the stars, are given in degrees, with the first decimal. The following diagram, in which the direction of passage through the field is indicated, will sufficiently explain the mode of measurement; the larger being always considered as the central star. The *distances* between the stars (always from centre to centre) are given to seconds with the first decimal place.

After Binary and Double Stars are placed Stars with Remarkable Spectra, taken from the new edition of Birmingham's Red Star Catalogue and entered as Es.-Birm. followed by a number. Others are taken from various sources, a large number are derived from the Researches in Spectroscopic Photography undertaken with such brilliant success

[1] The subsequent great advantage of a 9½-in. silvered mirror has been less apparent here than in other respects. My experience concurs with that of Browning, who finds colour decrease with increasing aperture, so as to render stops serviceable, and of Huggins, to whom colour is imperceptible in too much or too little light. Es. and Fr. note the same fact. Es. also finds that in the case of the Red Stars there is a tendency to underrate the brighter and overrate the fainter, and the larger the instrument the more likely is this to occur.

at Harvard. Stars of type IV are all red; type III, orange red: type II, yellow; type I, and most stars of the bright lined class (type V) are white. It has been shown that in every 1000 stars, 560 are of type I, 374 of type II, 65 of type III, and 1 of type IV. Of type V about 50 only are known. The average of the first two magnitudes of each



type is I = 0·1, II = 1·3, III = 2·9, IV = 6·1, V = 8·0. May it not be possible that there is a VI type whose brightest member is yet beyond our reach? With the stars with remarkable spectra are placed the variable stars with their elements from Chandler's Catalogue (new edition). The short period variables are of the first and second types,

the long period variables are of type III with bright lines of hydrogen at max. Some few are of type IV, and this fact is noted after the star's elements. Then follow such Clusters and Nebulæ as are most conspicuous in a host of about 8000. Many of the great wonders are altogether beyond the 'common telescopes' of former years, but the unprecedented extension of optical power among amateurs has induced me to add to the previous list about 50 objects from the catalogue of h. which I have had no opportunity to examine, but which I believe will be found worthy of attention.

The Right Ascensions and Declinations have been brought up to 1900, by correcting for the Precession of the Equinoxes, which, by slowly carrying round the artificial network of meridians and parallels in front of the immovable heavens, is continually changing the *nominal places* (not the *relative positions*) of the stars.[1] No greater correctness is guaranteed than will answer the purpose of *finding* in a moderate-sized field. Globes and maps admitting of no such reduction, will require mental allowance on this account in proportion in their date.

As to optical management: close pairs and crowded clusters gain by increasing the power; so *in general* do dissimilar colours, and very minute points near larger stars;

[1] In the present edition the positions of the brighter stars are largely taken from the Draper Catalogue; for the stars with remarkable spectra, from Krüger's Catalogue of Coloured Stars. The remainder have been gone over in duplicate by myself in the first instance, and then by Mr. R. O. Horne. When any difference in results occurred the star's place has been recomputed. Mr. Horne has also compared the manuscript with the various data in the catalogues. The new edition contains the places of 2272 double stars, 629 stars with remarkable spectra, 276 nebulæ, a total of 3177 objects.

but experience will be the best guide. For difficult pairs we should follow H.'s advice, and adjust the focus previously upon a single star of nearly the same altitude, size, and colour; the peculiar aspect of the double star will be afterwards more striking. Occasionally a slight change, especially lengthening, of focus may relieve a weary eye. In estimating colours, keep near the centre of the field: its edges may not be achromatic.[1] Large nebulæ always require low powers; very small ones must be more magnified to show their nature, and resolvable ones, to insulate their sparkling points.[2] In most cases low powers have the advantage from the beauty and variety of their broad fields. The magnifiers used by myself with $3\frac{7}{10}$ inches ranged from 64 to 250, in a few instances 300.

In the following list, under the head of Double Stars, the *Synonym*, which stands first, is either a Greek letter, which is Bayer's designation; or an Arabic numeral, which (unless otherwise specified) is Flamsteed's; to these are added in parenthesis, where practicable, an Arabic numeral, preceded by Σ (the conventional symbol for the name of Wilhelm Struve), which refers to the great Dorpat Catalogue of Double Stars, or preceded by OΣ (Otto Struve) or β (Burnham), etc. In the class of Clusters and Nebulæ, the prefixed number is that in the General Catalogue of Sir J. Herschel (new edition); to which is subjoined, either M., followed by a numeral referring to Messier's Catalogue of Nebulæ in the 'Connoissance des Temps' for 1783 and

[1] All light should be covered while observing colours. A square box, enclosing the lantern, the front of which can be made to slide up and down, is very useful.

[2] Many Nebulæ are yet undiscovered and much good work might be done by sweeping for them with a low power, and sufficient aperture.

1784; or H., the Roman numeral after which shows the class in the catalogues of that observer. After the Synonym comes the *Place in the Heavens*, given first in hours and minutes and decimal of a minute of Right Ascension, then in degrees and minutes of Declination, marked N or S, as the case may be; the Italic letters, *n* (north), *s* (south), *p* (preceding), and *f* (following), being employed to indicate the relative positions of neighbouring objects. Next are placed (in the case of Double Stars) the *Magnitudes* in corresponding Arabic numerals separated by a comma. Then follow the *Position-angles*, the *Distances*, and the *Colours;* with occasional remarks from other authorities.

For many descriptions of objects, and directions for finding them, the author is responsible.

Abbreviations (additional) and Symbols;—A., *Argelander;* B., *Birmingham;* β, *Burnham;* D'A., *d'Arrest;* De., *Dembowski;* Do., *Doberck;* Du., *Dunér;* Es., *Espin;* F., *Flamsteed;* Fl., *Flammarion;* Fr., *Franks;* Gl., *Gledhill;* H., *Sir W. Herschel;* h., *Sir John Herschel;* Hh., *Sir John Herschel's Catalogue of his father's Double Stars;* Ha., *Hall;* K., *Knott;* Ll., *Lalande;* M., *Messier;* Perr., *Perrotin;* σ., *The stars in the appendix to Vol. III. of the Poulkova Observations;* OΣ, *Otto Struve;* OΣΣ, *Poulkova Cat., Part II.;* S., *South;* P. Sm., *Piazzi Smyth;* Sa., *Sadler;* Wa, *Ward.*—Bin., *binary;* c. p. m., *common proper motion;* var., *variable;* v., *very;* bl., *blue;* blsh., *bluish;* grn., *green;* grnsh., *greenish;* or., *orange;* y., *yellow;* ysh., *yellowish;* w., *white*, etc.; wy., *whitish yellow;* yr., *yellowish red*, etc.; o., *no colour given.*

ANDROMEDA.

This constellation is rich in interesting objects of every class; on the meridian, however, it is inconveniently high for an achromatic telescope, and should therefore be examined some hours E. or W. of it, like many other similarly situated regions. Its upper part towards the Galaxy contains very fine sweeping.

Double Stars.

Σ 3058. $0^h\ 0^m$, N 29° 45′ : 7·7, 9·2 : 49°·9 : 12″·5 : w., o.

OΣ 547. $0^h\ 0^m{\cdot}2$, N 45° 16′ : 8·3, 8·3 : 110°·9 : 4″·5 ; rsh. Bin. c. p. m. Ha., '91 : 340°·7 : 4″·3.

22. $0^h\ 5^m{\cdot}1$, N 45° 31′ : 5 ; wh., 1838. Clear yellow, 1850. Guide to an elegant pair, Σ 3 : 7·5, 8·5 : 84°·1 : 4″·9.

OΣ 2. $0^h\ 8^m{\cdot}4$, N 26° 26′ : 6·9, 8·3 : 43°·8 : 0″·9. Ha., '91 : 38°·5 : 0″·6 ; Bin. *comes* 9·6 : 226°·2 : 17″·8.

Σ 17. $0^h\ 11^m{\cdot}3$, N 28° 45 : 8, 9·2 : 29°·3 : 26″·3 : y., o. β *comes* 11·5 : 266°·5 : 2″·4. In a wide sprinkle.

Σ 24. $0^h\ 13^m{\cdot}3$, N 25° 36′ : 7·2, 8 : 248°·4 : 5″·2 : w. Bird, minute *comes s.* A pretty pair.

26 (OΣ 5). $0^h\ 13^m{\cdot}5$, N 43° 14′ : 6·5, 10·2 : 240°·7 : 6″·4.

28 (β 1095). $0^h\ 24^m{\cdot}8$, N 29° 12′ : 5·5, 13·3 : 0°·1 : 2″·4.

Σ 33. $0^h\ 25^m{\cdot}6$, N 33° 32′ : 8·2, 8·3 : 205°·5 : 2″·5 : w.

Σ 40. $0^h\ 29^m{\cdot}8$, N 36° 17′ ; 6·8, 8·8 : 312°·2 : 11″·6 : y. ash.

π (OΣΣ 4). $0^h\ 31^m{\cdot}5$, N 33° 11′ : 4·1, 8·0; De 173°·3 : 36″·3 : ysh., bl. β distant 11·5. Fr., pair, 5^m *p* : 6, 9 : y., bl.

Σ 44. $0^h\ 33^m{\cdot}0$, N 40° 26′ : 8·3, 9 : 258°·8 : 7″·9. Ha., '85 : 265°·3 : 9″·4 : ysh.

δ (β 491). 0° 33′·9, N 30° 19′ : 3, 12·5 : 299°·3 : 27″·9.

Σ 47. $0^h\ 35^m{\cdot}1$, N 23° 30′ : 6·7, 8·6 : 204°·7 16″·6 : w., o.

Σ 52. $0^h\ 38^m{\cdot}6$, N 45° 41′ : 8, 9 : β 19°·1 : 1″·5 : ysh.

Σ 55. $0^h\ 39^m{\cdot}0$, N 33° 4′ : 8, 8·8 : 322°·9 : 2″·1 : w.

[ANDROMEDA]

Σ I 1. 0^h $41{\cdot}0^m$, N 30° 24′ : De., 7·0, 7·3 : 53°·7 : 46″·4 : y. Curious similarity. Fr., *p* deeper '76. Es. minute star between. $1\frac{1}{2}°$ *f* δ. Gr., small wide pair, 35′ *np*.

Σ 72. 0^h $49{\cdot}1$, N 38° 38′ : 8, 9 : 182°·3 : 24″·3 : ysh.

36 (Σ 73). 0^h $49{\cdot}6^m$, N 23° 5′ : 6·2, 6·8 : 307°·8 : 0″·8. Ha., '89 : 9°·6 : 1″·2. Bin. Lewis, 137·5 yrs. Beautiful, and not difficult object. Closely *np* η towards ζ : visible to naked eye. Strong yellow.

μ. 0^h $51{\cdot}1$, N 37° 57′ : 4, 16. Sm. β 116°·9 : 38″·0 Inserted as a light test; depending, however, like others, mainly on atmospheric conditions. D., who rated it $11\frac{1}{2}$, or at most $11\frac{1}{4}$, of Σ's scale, glimpsed it with 4·8 in. of 8-in. achr. even when his vision was slightly impaired. Wa. has seen it with $4\frac{8}{10}$-in. achr. I held it pretty steadily in the presence of μ with $9\frac{1}{3}$-in. spec., so Fr., with 5-in. achr. Buffham glimpsed it with $6\frac{1}{2}$ in. of 9-in. spec. β, a fainter *comes*, 314°·4; 37″·3.

Σ 79. 0^h $54{\cdot}4^m$, N 44° 11′ : 6, 7 : 192°·4 : 7″·6 : v. w., blsh. w.; 7 grnsh., 9-in. spec. '71, so Fr., '76. Very beautiful.

φ (OΣ 515). 1^h $3{\cdot}7^m$, N 46° 42′ : 4·9; 6·5 : y., grn. : 315°·9 : 0″·6. β '79 : 272°·4 : 0″·3. Bin.

β 398. 1^h $6{\cdot}1^m$, N 47° 16′ : 8, 8 : De. 50°·5; 1″·8.

Σ 112. 1^h $14{\cdot}8^m$, N 45° 49′ : 8·5, 9 :. 327°·2 : 23″·6 : yw.

ω (β 999). 1^h $21{\cdot}6^m$, N 44° 54′ : 5·3, 12 : 100°·2; 2″·3, '92. Bin.

Σ 140. 1^h $33{\cdot}1^m$, N 40° 34 : 8·5, 9·2 : 172°·3 : 3″·3 : w.

Σ 141. 1^h $34{\cdot}2^m$, N 38° 28′ : 8, 8·5 : 300°·6 : 1″·7 : ysh.

Σ 154. 1^h $39{\cdot}0^m$. N 43° 11′ : 8, 8·2 : 126°·7 : 5″·2 : v. w.

Σ 162. 1^h $43{\cdot}0^m$, N 47° 24 : 7, 7·5 : 225°·5 : 1″·9 (β '80 : 217°·1) v. w. *Comes* 9·7 : 179°·5 : 20″·4. (Bird, dark bl.).

[ANDROMEDA]

Σ 3113. 1^h 47·3, N 44° 8′ : 8·7, 8·7 : 270°·5 : 1″·5 : o.

56 (Σ I. 4). 1^h $50^{\cdot}2^m$, N 36° 46′ : De., 5·7, 5·8 : 301°·4; 181″·7 : yellow. *p* larger and ruddier 1850; nearly equal, *p* redder, 9-in. spec. 1871. Whitley, *p* smaller, y., or., '69; Fr., *p* smaller, '76.

Σ 195. 1^h $54^{\cdot}0^m$, N 43° 58′ : 8·5, 8·8 : 194°·6 : 3″·1 : w.

γ (Σ 205). 1^h $57^{\cdot}7^m$, N 41° 51′ : 3, 5 : 62°·4 : 10″·3. Gold, blue. One of the most beautiful pairs in the heavens, though probably stationary, and devoid of the interest of a binary system. It seems to have been first noticed by C. Mayer in 1788. In 1842 OΣ found the companion double, so close that common telescopes will not even elongate it (though it has been done with 4¼ Cooke), and the finest can only divide it. This has been effected under exceptional circumstances with a 5-in. O.G.: 8-in. were formerly certain. With's and Calver's 6½-in. mirrors would split it, and those of 8½-in. were guaranteed to do so.

Binary; D., 125°·5 : o″·4, '42; Ha., 101°·8 : o″·4, '77. β 98°·2 : o″·09, '89; elong. (?) '90; 318°·6, '91. Considerable and unaccountable discrepancy as to m^{as} : 5·5, 6·8 have been thought probable. Variation has not been suggested. Murray, D., and Jacob have noticed difference in colour, y., bl.; Fl. gives grn., bl.; Fr., bl., ysh. De., m^{as}. 6·1 : 8·o.

In examining such test objects, it is important to note the difference between one long disc crossed by a dark interference line, which is sometimes called division, and two round discs with black sky between them.

59 (Σ 222). 11^h $4^{\cdot}8^m$, N 38° 34′ : 6·7, 7·2 : 34°·8 : 16″·4 : v. w. Grover, neat pair, 10′ *np* : est. 140° : 12″.

Σ 228. 11^h $7^{\cdot}6^m$, N 47° 1′ : 6·7 7·6 : 262°·1 1″·1 : w. Ha., 156°·2 : o″·4 : '81; 51°·3 : o″·3, '90. Rapid bin.

[ANDROMEDA]

Σ 245. 1^h $12{\cdot}4^m$, N 39° 49′ : 7, 8 : 291°·8 : 11″ : yw., blsh. w.

Σ 248. 1^h $14{\cdot}8^m$, N 42° 19′ : 8·9, 8·9 : 161° : 1″·6 : ysh.

Σ 250. 1^h $15{\cdot}2^m$, N 36° 58′ : 8·5, 9 : 135°·8 : 3″·2 : w.

Σ 251. 1^h $15{\cdot}6^m$, N 38° 56′ : 8·2, 9 : 264°·9 : 2″·2 : yw.

σ 70. 1^h $16{\cdot}6^m$, N 41° 2′ : β 6·6, 10 : 358°·5 : 53″·3 : y., o. I failed to see the companion '51 (Fr. less than 11, '76), but the object guides to a pretty open 8 m^g. pair, one of which is P. II. 62. Field fine with low powers. About $\frac{1}{3}$ from γ towards Algol.

2 (β 1147). 22^h $58{\cdot}0^m$, N 42° 13′ : 5·7, 8·5 : 323°·4 : 0″·2. Bin.

Σ 2985. 23^h $5{\cdot}4^m$, N 47° 25′ : 7, 8 : 252°·1 : 15″ y. w., blsh.

8 (β 717). 23^h $13{\cdot}1^m$, N 48° 28′ : 5·3, 12·7 : 161°·8 : 7″·4.

Σ 3004. 23^h $16{\cdot}0^m$, N 43° 35′ : 6·5, 10 : 177°·7 : 13″·1 : v. w., o.

Σ 3010. 23^h $18{\cdot}7^m$, N 45° 15′ : 8, 8·7 : 132°·4 : 25″·3 : ysh.

Σ 3024. 23^h $28{\cdot}3^m$, N 43° 17′ : 8·2, 9 : 311°·6 : 4″·9 : w.

OΣ 500. 23^h $32{\cdot}7^m$, N 43° 52′ : 6·1, 7·0 : 295°·4 : 0″·5 : w., bl. Ha., 322°·6, '83. Bin.

β 995. 23^h $42{\cdot}6^m$, N 46° 17 : 6·2, 10·2 : 243°·4 : 0″·9.

Σ 3042. 23^h $46{\cdot}9^m$, N 37° 19′ : 7, 7 : 89°·3 : 4″·2 : v. w. Fr., ysh., '76.

Σ 3043. 23^h $47{\cdot}8^m$, N 38° 7′ : 8·4, 9·2 : 250° : 15″·5 : w.

Σ 3048. 23^h $53{\cdot}0^m$, N 23° 46′ : 7·7, 8·8 : 314°·3 : 9″·2 : y w., o : 8·8 decidedly bl., '50; 8, 10 : bl.? A 12 m^g. *comes*, 9-in., '71. Fr., quite two m^{gs}. diff., '76; Grover, *comes* beautiful blue, '74.

[ANDROMEDA]

Σ 3050. XXIII^h 54·4^m, N 33° 9′ : 6, 6 : 191° : 3″·8 : ysh., '32. Ha., 206°·8 : 2″·8 : '87. Bin.

6 (β 860). XXIII^h 54·9^m, N 38° 18′ : 6·8, 11·6 : 107°·2 : 6″·7.

Stars with Remarkable Spectra and Variables.

Es-Birm. 4. 0^h 14·6^m, N 44° 9′ : 8·2 : R. : IV : Du.

R (var.). 0^h 18·8^m, N 38° 1′ : var. 5·6–8·6 below 12·8 in 410·7 days. At Bonn : F bright at max. and other lines. Es.

Es-Birm. 10. 0^h 22·2^m, N 35° 2′ : 8·1 : R. : IV : Du.

Es-Birm. 723a. XXIII^h 7·7^m, N 52° 17′ : 8·2 : R. : III : Es.

8. XXIII^h 13·1^m, N 48° 28′ : 4·9 : III : Se : orange.

Es-Birm. 765. XXIII^h 59·3^m, N 43° 3′ : 8·6 : R. : IV : Es.

Nebulæ and Groups.

205 (H. V 18). 0^h 34·9^m, N 41° 8′. Large faint oval neb. best with low power; res. by Bond: a very large field includes it with 221 and 224. Seems to sparkle; much more oval and less spindle-shaped than as drawn by Bond.

224 (M. 31). 0^h 37·3^m, N 40° 43′. One of the grandest in the heavens; long, oval, or irregularly triangular, ill-bounded, and brightening to the centre; so plain to the naked eye that it is strange that the ancients scarcely mention it. It is, however, referred to as a familiar object by the Persian astronomer, Sûfi, in the tenth century. By moving the telescope rapidly to gain contrast, Bond extended it to the surprising dimensions of 4° in length and 2½° in breadth, of which common instruments show little,

[ANDROMEDA]

and less in proportion to the increase of power. No telescope has been able to deal with its nature; Bond's $14\frac{1}{2}^{9}_{10}$-in. found no resolution, though it was seen through a rich stratum containing 1500 stars. It detected, however, two curious dark streaks, like narrow clefts, both beyond any ordinary instruments, in which the darker of them forms in reality the boundary of one side of the nebula as seen with a small aperture: both well seen by Se. with $9\frac{9}{10}$-in. achr.: I have caught one with difficulty with $5\frac{1}{2}$-in. achr., '63. Grover has seen both with $6\frac{1}{2}$-in. silvered mirror, and I have traced them through a long extent with 8-in. mirror (With), 1864; but this was *after the knowledge of the fact*, which has a great influence upon the eye; the truth of H.'s remark being often exemplified, that less optical power will *show* an object than was required for its discovery. Huggins finds spectrum continuous, but cut off at the red end. It seems, therefore, not gaseous; if stellar, it is strange that, comprising such extremes of feebleness and condensation, it can be resolved with certainty nowhere, the nucleus only, of about 7, showing a granular texture in great instruments. A 14 m^{s}. s'ar, *np* nucleus not always seen, 9-in. A star of the 7 m^{s}. was detected near the nucleus by Ward, Aug. 19, 1885, and by several other observers independently and subsequently. It faded to 16 m^{s}., Feb. 7, 1890, Hall, power 383, 26-in. refractor. Es. glimpsed it with difficulty on March 6, with 1000 on $17\frac{1}{4}$-in. Es. thinks nucleus var., and sees star in it. Confirmed by Young with 23-in. Huggins found bright lines in the Nova. Roberts, by photography, shows the rifts extending all round the Nebula (20-in.); a photo. with short focussed 6-in., shows the same. There is some deep mystery here.

221 (M. 32) is in the same field with a low power; small,

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but bright; resolved into stars by E. of Rosse, 3-ft. spec., and Buffham's 9-in. (With). Spect. like that of M. 31.

404 (H. II 224). $1^h\ 3{\cdot}9^m$, N 35° 11. Rather faint; but easy with $9\frac{1}{3}$-in. spec. *np* β, 2 m^s., strong y., in the same field. D'A., strong nucleus. E. of Rosse, resolvable.

Pretty group, ± $1^h\ 18{\cdot}8$, N 38° 30′.

752 (H. VII 32). $1^h\ 51{\cdot}8^m$, N 37° 11. Wide, rich region, especially of small stars.

1023 (H. I 156). $11^h\ 34{\cdot}1^m$, N 38° 38′. One of H.'s bright-class neb., lenticular, 5′ long, with stellar nucleus.

7662 (H. IV 18). $\text{XXIII}^h\ 21{\cdot}1^m$, N 41° 59′. Small, but very bright. La. sees nucleus and 2 oval rings: E. of Rosse spiral. My $9\frac{1}{3}$-in. spec. shows blsh. disc with woolly border, and suspicion of dark centre. Huggins, 8-in. achr. annular, grnsh. bl.; spectrum of 4 bright lines. To find it, sweep 24^m *f o*, 4 m^s.

ANSER. See *VULPECULA.*

ANTINOUS. See *AQUILA.*

AQUARIUS.

A dull-looking constellation, but well repaying telescopic research.

Double Stars.

4 (Σ 2729). $\text{XX}^h\ 46{\cdot}1^m$, S 6° 0′ : 5·9, 7·2 : 24°·5 : 0″·7 : y., '29. Ha., 175°·9 : 0″·5 : '87. Bin. 129·8 years. Do.

7 (β 1034). $\text{XX}^h\ 51{\cdot}5^m$, S 10° 5′ : 6, 11·7 : 165° : 2″·1.

12 (Σ 2745). $\text{XX}^h\ 58{\cdot}8^m$, S 6° 13′ : 5·6, 7·7 : 189°·6 : 2″·7 : y., bl. Brightest of vicinity.

Σ 2781. XXI. $11{\cdot}4^m$, S 8° 5′ : 7·8, 7·8 : 172°·1 : 3″·3 : w.

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β (h. 936). XXI^h 23·6^m, S 6° 1′ : 3, β 10·9 : 318°·9 : 34″·3 : y., *comes* scarcely suspected, $3\frac{7}{10}$. Wa. considers it test for $4\frac{1}{2}$ to 5-in. achr. β Two close pairs, *p* 10′ *n*.

Σ 2809. XXI^h 32·4^m, S 0° 51 : 6, 8·4 : 163°·5 : 31″·1 : w., o : *f* M 2, a little *n*.

24 (β 1212). XXI^h 34·4^m, S 0° 31′ : 6·3, 7·1 : 261°·0 : 0″·5. Bin. Distant 10·9.

Σ 2817. XXI^h 36·8^m, S 0° 6′ : 8·2, 8·5 : 156°·3 : 25″·9 : w. : in fine field.

Σ 2825. XXI^h 41·8^m, N 0° 23′ : 8, 8·2 : 100°·2 : 1″·1 ysh. Ha., 113°·8 : '87.

Σ 2838. XXI^h 49·4^m, S 3° 47′ : 6, 8·8 : 185°·2 : 21″·6 : ysh., o. *Comes* more like Sm.'s 10, and pale lilac, '75. Curious and beautiful stream of small stars, *np*.

Σ 2847. XXI^h 52·9^m, S 3° 58′ : 7·6, 8 : 296°·6 : 1″·2 : ysh.

h. 5524. XXI^h 56·1^m, S 16° 6′ : 6, 9 : 290° : 80″. Howe 6, double; β 11, 270°·5 : 8″·9.

Σ 2851. XXI^h 56·3^m, S 12° 28′ : 8, 8·3 : 120°·8 : 19″·1.

29 (S 802). XXI^h 57·0^m, S 17° 27′ : β 8, $8\frac{1}{2}$: 242°·4 : 4″·1. Both 6 m^s., w. Very little diff. in size: *p* perhaps the smaller, '49, '51–3–5; pale yellow, $7\frac{1}{2}$ m^s., '55; *p*, o·3, smaller, 9-in. spec., '71; Howe, 6, 6·2, '77.

Σ 2862. XXII^h 2·0^m, N 0° 5′ : 7·6, 8 : 104° : 2″·3 : ysh., y.

35. XXII^h 3·5^m, S 19° 1′ : 6 : guide to a pair, *np* : 8·5, 8·5 : est. 75° : 2″ : β.

41 (H*h*. 753). XXII^h 8·8^m, S 21° 35′ : Ha., 6, 8 : 115°·7 : 5″·0. Reddish, blue. A 7 m^s. (Ll. 9), to which β gives a very minute *comes*, est. 270° : 10″, makes it a pretty group.

Σ 2887. XXII^h 12·2^m, S 1° 12′ : 9, 9 : 25°·7 : 8″·8.

51 (β 172). XXII^h 18·9^m, S 5° 20′ : 5·6, 5·7 : 12°·1 : 0″·7, '91. Bin. Retrograde Mot.

53 (H*h*. 762). XXII^h 21·2^m, S 17° 15′ : Ha., 6, 6 : 304°·2 :

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7″·4 : dist. dim., '86 : w., *p* smallest, '49. So Fr., '76. Slow bin.

ζ (Σ 2909). XXII^h 23·7^m, S 0° 32′ : 4, 4·1 : 359°·8 : 3″·6 : grnsh. w. : '25 Maw, 324°·0 : 3″·1 : '91. pale y., '51. A very fine object : two suns revolving in 1624·8 yrs. Do. Easy with very small aperture. In centre of triangle of nearly equal stars, all easy to naked eye. 44^s *f*, 11′ *s*. β finds pair 8·5, 10–11 : 1″·5.

Σ 2913. XXII^h 25·3^m, S 8° 38′ : 7, 8 : 331°·9 : 8″ : w., rsh. '30. 9, 10 of Sm.'s scale 9-in. spec., '71. Fr., 8, purpsh. : 8, 9; '79.

η XXII^h 30·2^m, S 0° 38′ : 1½° *s* is 60, 6 m^s. 13′ *s* of which β finds pair 8·5, 9·5 : est. 210° : 2″ : *comes* 13 m^s. *sp.*

Σ 2928. XXII^h 34·2^m, S 13° 8′ : 8, 8 : 327°·7 : 4″·7 : w. Bin?

Σ 2935. XXII^h 37·7^m, S 8° 50′ : 7, 7·8 : 313°·3 : 2″·6 : v. w. 8·5 grey, or blsh? '50. So Se., '55; Fr., ysh. blsh., '76. 2½° *p* λ, a little *s*.

τ^1 (Σ 2943). XXII^h 42·4^m, S 14° 35′ : 6, 9·2 : 112°·2 : 30″·7 : v. w., o. Ha., 115°·4 : 27″·3 : '88.

Σ 2944. XXII^h 42·7^m, S 4° 44′ : 7, 7·5, 8·4 : 246°·9; 157°·5 : 4″·1 : 55″·8 (β 252°·8; 140°·8 : 3″·9, 48″·6 : '77) ysh., w., w. 8·4 blsh., '49. Bin.

τ^2 (H*h*. 781). XXII^h 44·3^m, S 14° 7′ : beautiful or. : 5 m^s. star, with distant *comes* H., 10 m^s.; Fr., 9 m^s. lilac or blsh.

β 178. XXII^h 50·0^m, S 5° 31′ : De. 6·0, 8·0 : *cuneo* : 324°·6.

Σ 2959. XXII^h 52·0^m, S 3° 47′ : 6·5, 10·5 : 96°·7 : 15″·7 : w., o. β 102°·2 : 13″·8; *comes* to 10·5, 12·5 : 95°·9 : 8″·3.

Σ 2970. XXII^h 57·1^m, S 11° 51′ : 8·5, 9 : 35°·3 : 8″·4. Pretty.

Σ 2981. XXIII^h 4·3^m, S 9° 22′ : 8·8, 8·8 : 112°·4 : 3″·6 : o.

Σ 2988. XXIII^h 6·8^m, S 12° 28′ : 7·2, 7·2 : 281° : 3″·7 : ysh.

[AQUARIUS]

Σ 2993. XXIII^h 8·8^m, S 9° 28′ : 7, 7·8 : 177°·9 : 25″·6 : wh. Field interesting.

ψ^1 (Σ II 12). XXIII^h 10·6^m, S 9° 38′ : 4·5, 8·5 : 312°·2 : 49″·6. Very yellow, blue. Fixed. β doubles 8·5 : 9·1, 9·2 : 94°·3 : 0″·2. β sees two minute *comites* at 18″ and 63″.

Σ 2995. XXIII^h 11·4^m, S 2° 8′ : 7·7, 8 : 26°·7 : 4″·6 : w.

94 (Σ 2998). XXIII^h 13·8^m, S 14° 0′ : 5·2, 7·2 : 345°·1 : 13″·4 : y w, bl. Yellow with perhaps reddish glare, greenish, '49. Fixed. Σ ascribes c.p.m. to this beautiful pair.

95 (Howe 199). XXIII^h 13·8^m, S 10° 10′ : β 5, 11·8 : 218°·6 : 1″·1.

Σ 3008. XXIII^h 18·6^m, S 9° 0′ : 7, 8 : 273°·3 : 7″·5 : ysh. ash : Ha., 252°·3 : 4″·6 : '84.

ω^2 (β 279). XXIII^h 37·5^m, S 15° 6′ : De., 5, 11 : 87°·8 : 5″·7. Test for 4½ or 4-in achr.

107 (H*h*. 807). XXIII^h 40·8^m, S 19° 14′ : De., 5·3, 6·5 : 139°·9 : 5″·6 moving. White or ysh, blue, '50. De., both w. Se., red, bl., '55. P. Sm. thinks cols. var. Bin?

Stars with Remarkable Spectra and Variables.

3 XX^h 42·5^m, S 5° 24′ : 4·2 : orange : III.

Es-Birm. 689 XX^h 44·1^m, S 0° 56′ : 6·8 : orange : III. D'A.

T (var.). XX^h 44·7^m, S 5° 31′ : 6·7–8·7 to 12·4–13 : 203·3^d. Goldschmidt.

V (var.). XXI^h 57·9^m, S 17°·16 : 10? to 14? Per. unknown. Peters.

π. XXII^h 20·2^m, N 0° 53′ : 5 : bright lines : Pickering.

S (var.). XXII^h 51·7^m, S 20° 53′ : 7·7–9·1 to below 12·5 : Per. 279·7^d : A.

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R (var.). $\text{XXIII}^{h}\ 38{\cdot}6^{m}$, S 15° 50′ : 5·8–8·5 to 11 ? . $387{\cdot}2^{d}$. Harding.

Nebulæ and Groups.

7009 (H. iv. 1). $\text{XX}^{h}\ 58{\cdot}7^{m}$, S 11° 46′. Planetary: somewhat elliptic : very bright for an object of this nature; pale bl.; not well defined in $5\frac{1}{2}$-ft. achr., but bearing magnifying more like a planet than a common nebula. One of the finest specimens of these extraordinary bodies, to which their discoverer, H., assigned a distinct class. E. of Rosse finds a very thin ray on each side, which I saw with Huggins's 15-in. achr. La. detects within it a bright well-defined elliptic ring. Buffham, 9-in. spec., an opening. Se., who made its diameters 25″ and 17″, saw it sparkle, and thought it a heap of stars. The spectroscope, however, of Huggins reveals the astounding fact that it is a mass of incandescent gas. About $1\frac{1}{3}°$ *p. v.*, 5 m^{s}.

7089 (M. 2). $\text{XXI}^{h}\ 28{\cdot}3^{m}$, S 1° 16′. Beautiful round neb. diam. 5′ or 6′, showing with $3\frac{7}{10}$-in. a granulated aspect, the precursor of resolution. With 9-in. spec. resolution evident the margin seems to diffuse itself away, probably in rays. h. compares it to a heap of fine sand, and considers it to be composed of thousands of 15 m^{s}. stars. Sm. observes that "this magnificent ball of stars condenses to the centre and presents so fine a spherical form, that imagination cannot but picture the inconceivable brilliance of their visible heavens to its animated myriads."

Very curious symmetrical group, ± $\text{XXIII}^{h}\ 11^{m}$, S 5° 3′.

Fine field, *lucida* 7 m^{s}. ± $\text{XXIII}^{h}\ 29^{m}$, S 10° 33′.

AQUILA AND ANTINOUS.

Al Tair (XIX^h 45·9^m, N 8° 36′), the *lucida* of this rich constellation has been thought var., and has a very sensible p. m. All the Galaxy here is strewed with pairs and groups of stars.

Double Stars.

OΣ 361. XVIII^h 38·7^m, N 5° 32′ : 7·5, 8·2 : 172°·5 : 22″·7.

Σ 2369. XVIII^h 38·9^m, N 2° 32′ : 7·5, 8 : 98°·2 : 1″·5 : w.

5 (Σ 2379). XVIII^h 41·4^m, S 1° 3′ : 5·6, 7·4 (Se., 5, 5 : ·55 De., 6·3, 7·3 : ·66) : 121°·5 : 13″·2 : w., blsh. A *comes* (β 11·2 : 145°·5 : 27″·5) so minute, Sm. says, as to have escaped former observers, except H. I have on several occasions, 1850–1852, seen it more or less distinctly by averted vision. It rather improves with magnifying : very minute, 9-in. spec., ·71. Colours of large stars, w., pale violet, ·50 : 6, 8 : pale y., ruddy, ·71.

Σ 2399. XVIII^h 44·5^m, N 13° 6′ : 8·2, 8·8 : 119°·6 : 15″·7 : o. Quadruple.

Σ 2404. XVIII^h 46·1^m, N 10° 51′ : 5·8, 7 : 183°·2 3″·5 : y., bl. Cols. remarkable. Fr., 5·8 or., red, ·78.

Σ 2408. XVIII^h 47·3^m, N 10° 39′ : 7·5, 8·7 : 96°·6 : 2″·3 : w., ash.

Σ 2412. XVIII^h 48·0^m, N 13° 52′ : 8·4, 8·5 : 53°·3 : 1″·3 : ysh.

11 (Σ 2424). XVIII^h 54·5^m, N 13° 30′ : 5·7, 9·2 : 241°·6 : 18″·7 : grsh. w., ash. Yellow, greenish, or bluish, ·50. Equilateral with ϵ and ζ. A pretty 10 m^s. pair *f* a little *n* : another about 38′ *s* : 14′ *f* is Σ 2426 : 6·8, 8·2 : 79°·8 : 16″·9 : redsh. y., grey. Bird, Gl., and others reverse angle; De., 7·1, 9·0 : Fr. as Σ, 1876. 10, 6 m^s. closely *np* 11, stands between two curious groups.

[AQUILA AND ANTINOUS]

Σ 2425. XVIII^h 55·1^m, S 8° 15′ : 6·9, 7·7 : 183°·2 32″·1 : ysh., ash.

ϵ. XVIII^h 55·1^m, N 14° 56′, 3·5 m^s. is closely followed by a triplet : Wa.

Σ 2428. XVIII^h 55·4^m, N 14° 46′ : 8, 9·8 : 288°·6 : 6″·4 : w., o. : De., 7·7, 10. "Handsome test-object," Sm. *Comes* occasionally distinct, though long past meridian, '50; 12 m^s., '71. 10′ *s* very little *f* ϵ, a beautiful yel. star. A fine field.

Σ 2436. XVIII^h 57·4^m, N 8° 36′ : 7·4, 8·1 : 309° : 34″·6 : y w., blsh. w.

Σ 2437. XVIII^h 57·5^m, N 19° 1′ : 7·8, 8 : 80°·8 : 1″·1 : w. Ha., 65°·7 : 0″·9, '84 : Bin.

Σ 2434. XVIII^h 57·6^m, S 0° 52′ : 7· 9, (8·4, 10·3) : 147°·0, 80°·5 : 25″·6, 1″·9 : w. Ha., 129°·6, 65°·7 : 23″·8, 1″·6, '85. β close pair easy, 6-in. achr. I have not seen it.

Σ 2439. XVIII^h 59·6^m, S 7° 18′ : 8, 9 : 199°·5 : 22″ : w.

Σ 2443. XVIII^h 59·5, N 14° 38′ : 8·2, 8·6 : 312°·8 : 6″·3 : w.

15 (H*h*. 598). XVIII^h 59·7^m, S 4° 11′ : Sm., 6, 7·5 : 206°·6 : 34″·5 : w. or yw., red lilac. Yellow, ruddy purple, '50. 1° nearly *n* from λ.

ζ (β 287) XIX^h 0·8^m, N 13° 43′ : 3, 12 : 61°·0 : 4″·7. Has been seen with $9\frac{4}{10}$-in. achr. A curious stream of stars *np*.

Σ 2446. XIX^h 0·9^m, N 6° 24′ : 6·3, 8·3 : 154°·4 : 10″·1 : w., blsh. Brightest in vicinity. Triple, nearly in line, 8, 10, 14; 14 est. 330° 12″. Unnoticed by Σ, var?

Σ 2447. XIX^h 1·4^m, S 1° 30′ : 6·7, 9·1 : 345° : 13″·8 : ysh.

Σ 2449. XIX^h 1·5^m, N 7° 0′ : 7·1, 7·8 : 292°·3 : 8″ : w.

59 (β 139). XIX^h 8·1^m, N 16° 40′ : De., 6·7, 8·0 : w., azure : 139°·5 : 0″·7. Distant 7·5 : y.

OΣΣ 178. XIX^h 10·8^m, N 14° 54′. About $\frac{1}{3}$ from ζ Aquilæ

[AQUILA AND ANTINOUS]

towards α and β Sagittæ are two 6 m^{g}. naked-eye stars near together. The *np* is a fine wide pair : 6, 8 : yel., pale lilac. The other is—

Σ 2489. XIX^{h} 11.9^{m}, N 14° 22′ : 6·5, 9·5 : 349°·3 : 8″·2 : w., o. (Fr. bl.). Very delicate.

OΣ 370. XIX^{h} 12·3^{m}, N 9° 9′ : 7·5, 8·2 : 14°·6 : 19″·6 : redsh., blsh.

23 (Σ 2492) XIX^{h} 13·5^{m}, N 0° 55′ : 5·5, 9·5 : 11°·1 : 3″·4 : y., bl. H. and Sm. found *comes* increasingly visible with higher powers, which struck me independently. Not perceived with 80, it was distinctly seen with 144. An elegant object, but requiring fine weather; easily found from δ and *ν*.

28 (OΣΣ 179). XIX^{h} 15·0^{m}, N 12° 12′ : De., 5·8, 8·2 : 175°·2 : 60″·3 : y., azure. 6, 9, yellow, lilac? '55.

Σ 2497. XIX^{h} 15·1^{m}, N 5° 24′ : 6·9, 8 : 358° : 30″ : ysh., w. A fine object.

Σ 2498. XIX^{h} 15·2^{m}, N 3° 51 : 7·2, 7·8 : 66°·7 : 12″·2 : y., purpsh.

26. XIX^{h} 15·2^{m}, S 5° 36′ : 5 m^{g}. serves as a guide to a delicate and very beautiful triplet 2^{m}.25^{s} (or 36′ of arc) *f* : 7·5 : or., with two bl. companions, 11, 12 : close together *n* a little *p*.

Σ 2510. XIX^{h} 18·5^{m}, N 9° 18 : 8·5, 8·5 : 181°·7 : 8″·7 : v. w., very pretty.

Σ 2513. XIX^{h} 20·1^{m}, N 2° 16′ ; 8·2, 8·8 : 313° : 2″·2 : yw.

β 142. XIX^{h} 22·6^{m}, S 12° 21′ : 7, 7 : De. 317°·7 : 1″·4 : w.

Σ 2519. XIX^{h} 22·7^{m}, S 9° 44′ : 8, 8·1 : 124°·2 : 11″·2 : v. w.

Σ 2533. XIX^{h} 24·9^{m}, S 0° 39′ : 7·2, 9 : 212°·2 : 23″·2 : v. w., o.

Σ 2532. XIX^{h} 25·1^{m}, N 2° 41′ : 6, 10·2 : 5°·0 : 34″·9 : gold, o., *comes* readily visible '50, '55, even considerably out

of focus, and several hours past meridian. Cols., orange and green : De., 10, '66 : K., 11–12, '71. 1° *f* δ, furthest of two. A pretty pair, very unequal, *np*.

Σ 2537. XIX^h 28·4^m, S 4° 24′ : 8·3, 8·7 : 130° : 19″·1 : yw., w.

37. XIX^h 29·6^m, S 10° 47′ : 5·5, has within about 1°*f*, 30′*n* 3 pairs. Σ 2541 : 8·2, 9·8 : 340° : 2″·8 : y., o. Ha., 327°·5 : 3″·9, '84. Σ 2545 : 6·2, 8·1 : 315°·2 : 3″·5 : w., bl., with distant *comes*, var.? Σ 2547 : 7·7, 9 : 332°·3 : 20″·7 : w., and a star with minute double *comes*, *np* Σ 2545.

χ (OΣ 380). XIX^h 37·9^m, N 11° 35′ : 6, 7 : 74°·3 : 0″·5 : y., v. y. Fixed.

Σ 2562. XIX^h 37·9^m, N 8° 8′ : 6·5, 8·2 : 252°·6 : 27″·2 : yw., ash : several minute points near, 9-in. spec. *comes* 10 m^s. closely *sp*. Equilateral with α and γ. 1° *p* lies a pretty pair, 9·5, 11 : and again, not far *sp* a very fine field.

Pair ± XIX^h 39^m, N 0° 53′ : in pretty field.

Σ 2567. XIX^h 39·4^m, N 12° 7′ : 7·7, 9·5 : 315°·7 : 18″·1 · v. w., o.

Σ 2570. XIX^h 40·2^m, N 10° 32′ : 7·3, 9·5 : 276°·2 : 4″·1 : w., o. A. G. C. 7·3 double. β 147·6 : 0″·3. Just *np* γ. A pretty group a little *n*.

γ. XIX^h 41·5^m, N 10° 22′ : 3 : very fine yellow. Beautiful field, with a curious doubly-curved row of stars a little *s*. 3′ *s* β points out a pair 10–11; est. 10° : 3″ : a 3rd star 20″ *p*, all seen by Wa. with $4\frac{3}{10}$-in. achr. It is now brighter than β, which may imply a change in one of the stars; though in many instances Bayer, who affixed the Greek letters in 1603, seems not to have been entirely influenced by m^s. β, according to OΣ, is carrying with it through space a very minute *comes* discovered by Lamont, 11–12 m^s. (Ha., 15°·9 : 12″·1 : '84); annual progress nearly 0″·5, orbital motion

uncertain. δ (with several delicate *comites*) is in a beautiful neighbourhood.

π (Σ 2583). XIX^{h} 44·0^{m}, N 11° 34′ : 6, 6·8 : 120°·7 : 1″·5 : ysh. Maw, 116°·7 : 1″·4, '88. Bin? y., green, '50; Sm., pale w., greenish, '36. Se., y., bl., '55. De., both w., '64, red. w., azure w., '69. Fr. as Σ, '79, great divergence as to colours. Not single, 80, very close 144; good test. 5½-in. showed a 14 m^{s}. star *np*, Sa., indigo. Common sees 3 others *np* with 18¼-in. spec.

Σ 2587. XIX^{h} 46·5^{m}, N 3° 50′ : 6·5, 9·2 : 98°·6 : 4″·1 : gold, o.

Σ 2589. XIX^{h} 47·4^{m}, N 0° 23′ : 8, 8·4 : 297°·6 : 5″·1 : v. w.

Σ 2590. XIX^{h} 47·5^{m}, N 10° 5′ : 7·1, 10 : 309°·2 : 13″·5 : v. w., o. : W., '64 : pale or., bl., '65. Sa., v. w., '74. Light test for moderate apertures. Sa., 12 m^{s}., '75, said to have been seen with 3-in. achr. Minute pair *p*, a little *s*. Just *fo*, 5 m^{s}. 1½° *n* of *a*.

Σ 2591. XIX^{h} 48·0^{m}, S 6° 16′ : 7·5, 8·5 : 108°·6 : 29″·2 : yw., w.

57 (Σ 2594). XIX^{h} 49·3^{m}, S 8° 29′ : 5·2, 6·2 : 171°·5 : 35″·6 : v. w. Distinctly contrasted, '51 : pale y., pale lilac, cols. entirely different, '55; a totally independent observation, as I had not identified the object; pale y., blsh. or grnsh., certainly unlike, 9-in. spec., '71; Whitley, bright w., redsh. w., '68. K., w., v. pale bl., '71 : De., yw., azure w., '72. Sa. as K., '75. Fr., ysh. w., blsh., or lilac, '76. This pair should be watched, as two of the first observers have attested the similarity of the colours.

Σ 2596. XIX^{h} 49·4, N 15° 1′ : 7·2, 8·6 : 353° : 2″·1 : ysh., ash. Sch. 337°·5, '77. Bin.

β 659. XIX^{h} 49·8^{m}, N 6° 53′ : 6½, 12·5 : 317°·3 : 12″·3.

[AQUILA AND ANTINOUS]

Σ 2597. XIX^h 50·0^m, S 7° 0′ : 6·9, 8 : 92°·1 : 1″·9 : w. *β* 88°·6 : 1″·2, '80. Bin.

β. XIX^h 50·4^m, N 6° 10′ : see under *γ*.

Σ 2612. XIX^h 56·5^m, N 6° 38 : 7·8, 8·8 : 52°·8 : 36″·6 : w.

Σ 2613. XIX^h 56·7^m, N 10° 28′ : 7, 7·2 : 350°·7 : 4″·7 : yw.

Σ 2618. XIX^h 58·9^m, N 15° 11′ : 8·6, 8·9 : 115°·5 : 5″·3 : w.

Σ 2621. XIX^h 59·8^m, N 8° 57′ : 7·7, 7.9 : 222° : 5″·7 : w.

β 57. XX^h 0·9^m, N 15° 13′ : De., 6·1, 10·6 : 118°·9 : 2″·3 : 2 *m. f* 34′ *n* is *β* 58 : De., 7·2, 10·3 : 187°·8 : 9″.

Σ 2628. XX^h 3·0^m, N 9° 6′ : 6·1, 8·2 : 349° : 4″·5 : yw., purp.

Σ 2634. XX^h 5·0^m, N 16° 30′ : 8, 9·5 : 13°·7 : 6″·4 : yw., bl. H., red, deeper red; but he was partial to red tints. I thought 8 w., '50; so De. (m^g. 7·5, 9·2), '67, and Fr., '76.

Hh. 671. XX^h 6·2^m, S 0° 25′ : Σ 7·5, 8 : Sm., 202°·2 : 54″·2 : ysh., blsh, '50, '71 : 1° *n* of *θ*.

Σ 2636. XX^h 6·4^m, S 4° 53^m : 8·2, 9·2 : 201°·8 : 12″·5 : o.

Pair ± XX^h 7·5^m, N 9° 51′ : 9, 10 : pale ruby, bl., very pretty.

Σ 2646. XX^h 9·1^m, S 6° 21 : 7, 8·8 : 51°·6 : 24″·7 : w., o.

Σ 2651. XX^h 9·2^m, N 15° 51′ : 8, 8 : 279°·9 : 1″·6 : w.

OΣΣ 202. XX^h 9·3^m, N 6° 17′ : De., 6·9, 7·3 : 192°·9 : 43″·4 : w.? w., bl., '71; K., both w., '71. Sa., coarse pair *sf.*

Σ 2654. XX^h 9.9^m, S 3° 49′ : 6·2, 7·7 : 233°·9 : 13″·9 : w. 8, 9 : y.? bl.? '55. De., 6·5, 7·7.

Σ 2661. XX^h 14·7^m, S 2° 34′ : 7·5, 8·7 : 342°·4 : 24″·3 : w. Fr., 8·7 : lilac, '76.

Σ 2670. XX^h 17·6^m, N 16° 4′ : 8·3, 8·7, 10·7 : 151°·3, 77°·7 : 30″·6, 16″·5 : yw., o.

Σ 2677. XX^h 19·5^m, N 0° 44′ : 6, 10·5 : 28·8 : 33″·1 : v. w., o. Sm. says "the companion is so minute that its distance is only an estimation." I saw it steadily with $3\frac{7}{10}$.

[AQUILA AND ANTINOUS]

A good test. Dc., 10·3; an isos. triangle with θ and 69, the s of two 7 m^{g}. stars; the other fine or.

Σ 2679. xx^{h} 19·9^{m}, N 19° 15′ : 7·4, 8·7 : 79°·8 : 21″·9 : w., o.

S. 749. xx^{h} 22·3^{m}, S 2° 26′ : Σ 7·2, 8·2 : β 189°·8 : 59″·6. W., grey, '50, '55; so Sa., '75; Fr., pale y., greyish w., '76. Each has a faint *comes*, and Sm. glimpsed a 5th. Field, if large, very fine.

69. xx^{h} 24·4^{m}, S 3° 13′ : 5 m^{g}. has a pretty triangle *sp*, one of which is 68, 7 m^{g}.

Pair ± xx^{h} 29^{m}, N 1° 4′ : 7, 9–10 : wide : or., bl., s in a triangle.

Stars with Remarkable Spectra and Variables.

T (var.). xviii^{h} 41·0^{m}, N 8° 38 : 8·8 to 10·0 : Winnecke : Per. 3 to 5 months.

Es-Birm. 576. xviii^{h} 52 4^{m}, N 0° 19′ : 9·2 : R. Bond. IV.? Es.

Es-Birm. 578. xviii^{h} 54·0^{m}, N 14° 14′ : 9·0 : R. Lamont. IV. Du. Es. var.?

V (var.). xviii^{h} 59·0^{m}, S 5° 50′ : 6·5, to 8 : Knott. Type IV.

R (var.). xix^{h} 1·5^{m}, N 8° 5′ : Red : 5·9–7·4 to 10·9–11·5 : Per. 351·0^{d}. At Bonn.

U (var.). xix^{h} 24·0^{m}, S 7° 15′ : 6·4 to 7·1 : Per. 7·02645^{d}. Sawyer.

Es-Birm. I. 507. xix^{h} 28·8^{m}, N 5° 15′ : 6·9 : red orange. B. III., D'A.

η (var.). xix^{h} 47·4^{m}, N 0° 45′ : 3·5 to 4·7 : Per. : 7^{d} 4^{h} 14^{m}. Pigott. II.

S (var.). xx^{h} 7·0 N 15° 19′ : 8·4–10·1 to 10·7–11·8 : Per. 146·71^{d}. Baxendell.

Clusters and Nebula.

6705 (M. 11). XVIII^h 45·7^m, S 6° 23′. Noble fan-shaped cl., "magnifica innumerabilium stellarum coacervatio" (D'A); at the upper edge of the broad luminous cloud which marks the shield of Sobieski. Sm. compares it to a flight of wild ducks. H., stars 11 m^s. divided into 5 or 6 groups, noted independently with 5½-in. An 8 m^s. star is a little within its apex; an open 8 m^s. pair *sf* beyond it. H., just visible to naked eye. Sometimes placed in Scutum Sobieskii.

6709. Beautiful wide group, XVIII^h 46·8^m, N 10° 14′ : 9·5–11 m^s.

6724 (h 2024). XVIII^h 52·3^m, N 10° 14′. Interesting field.

6781 (H. III 743). XIX^h 13·6^m, N 6° 21′. Large round faint neb., h. plan. E. of Rosse ring or spiral.

Curious line of 4 stars 8 m^s., ± XIX^h 21^m, N 12° 12′.

Wide group, ± XIX^h 24^m, N 11° 30′.

ARGO NAVIS.

Not in itself a remarkable constellation, but in a crowded part of the Galaxy.

β 578. VII^h 22·7^m, S 17° 40′ : 6·5, 11·8 : 53°·6 : 1″·7.

Σ 1101. VII^h 24·1^m, S 13° 36′ : 9, 9 : 89°·3 : 6″·2 : o.

Σ 1104. VII^h 24·8^m, S 14° 46′ : 6·7, 8·3 : 292°·4 : 2″·3 : w. Wilson, 323°·5, '86. Bin. c. p. m.

H*h*. 269. VII^h 30·1^m, S 23° 15′ : Wilson, 6, 6 : 109°·6 : 9″ : white or pale yellow '51, '56 *np* rather larger; so Se. (who gives red and blue), '56, and Gore, '75. Howe, pair; Wilson, 8, 9 : 203°·8 : 1″·8, 19 *s. p* 14′ *s.*

[ARGO NAVIS]

Σ 1121. VII^h 32·1^m, S 14° 15′ : 7·2, 7·5 : 304°·7 : 7″·5 : w. 33 sec. *p* is Σ 1120 : 6·5, 9·5 : 35°·3 : 19″·6.

h. 273. VII^h 34·7^m, S 26° 34′ : β 4·1, 4·1 : 318°·5 : 10″. White or pale yellow, '51, moving. β *comes to* B * : 229°·3 : 6″·5 : m^g. 13·8.

2 (Σ 1138). VII^h 40·9^m, S 14° 27′ : 6·2, 7 : 339°·2 : 16″·5 : w. W., pale bl., '51. In field with 4, 5 m^g. pale yellow. About 1° 20′ *s* a wide pair, deep or., has a bin. aspect 5½ in., '64. K., 6·4, 6·4 : 310°·7 : 128″.

5 (Σ 1146). VII^h 43·3^m, S 11° 57′ : 5·3, 7·4 : 17°·5 : 3″·3 : ysh. bl. Pale y., ruddy, '51. So Fr., '77.

ξ (β 1063). VII^h 45·1^m, S 24° 37′ : 3·7, 13·8 : 188°·7 : 4″·6.

9 (β 101) VII^h 47·2^m, S 13° 38′ : De., 5·6, 6·7 : 289°·4 : 0″·5 : w., '75. β 76° : 0″·3, '89 : 98°·7 : 0″·2, '92. Bin. 40·5 yrs. Glassenapp. See gives 23·377 yrs.

11. VII^h 52·6^m, S 22° 37′ : guides to a beautiful triangle. B.

19 (β 1064). VIII^h 6·6^m, S 12° 37′ : 6, 12·5 : 244°·9 : 1″·5. A distant 9 m^g.

β 207. VIII^h 34·2^m, S 19° 23′ : De., 6·5, 10·5 : 103°·6 : 4″·3.

β 208. VIII^h 34·8^m, S 22° 19′ : 6, 9 : 30° : 1″·4 : 'exquisite.'

Jacob 5. IX^h 26·3^m, S 28° 19′ : β : 6·3, 7·1 : 244°·8 : 1″.

Stars with Remarkable Spectra and Variables.

Es-Birm. 232. VII^h 21·5^m, S 20° 45′ : 8 : β. III? : Es.

Es-Birm. 238. VII^h 29·2^m, S 14° 18′ : 5·8 : fiery red : B. III. : Du.

Es-Birm. 253. VII^h 45·0^m, S 13° 50′ : 7·2 : yr. : IV? : Konkoly. III? Es.

* The principal star of a double is called A, the companion, B.

[ARGO NAVIS]

U (var.). VII^{h} 56·1^{m}, S 12° 34′ : 8·5–9·0 to below 14 : Per., 315^{d} : Pickering. IV : Du.

Es-Birm. 268. VIII^{h} 20·7^{m}, S 23° 43′ : 5·8 : R. Sm. III : Es.

Clusters and Nebulæ.

2422 (H. VIII 38). VII^{h} 32·0^{m}, S 14° 16′. Grand broad group, visible to the naked eye, too large even for 64; some brilliant 5 or 6 m^{s}. stars, including Σ 1121, which see *supra*. About 2½° *f* is a group round 4, 5 m^{s}. A fiery 5 m^{s}. (B. 7 m^{s}.) leads the region (Es-Birm. 238).

2437 (M. 46). VII^{h} 37·2^{m}, S 14° 35′. Beautiful circular cloud of small stars (H., 10 m^{s}.) about ½° in diam.: a little *p* the group round 4, nearer to it than 2422. 2438, a feeble neb. on its N. verge is in La.'s 20-ft. refl., 'an astonishing and interesting object'; he and E. of Rosse see it annular: so Buffham, 9-in. 'With.' Not gaseous.

2440 (H. IV 64). VII^{h} 37·5^{m}, S 17° 58′. Plan. neb. bright; pale blsh. w.; H., 12″ or 15″. With my 64, like a dull 8 m^{s}. star: with more power, small, brilliant, undefined, surrounded with a little very faint haziness. In a glorious neighbourhood. E. of Rosse, a red star 9-10 m^{s}. *f*. I find no spectroscopic result.

2447 (M. 93). VII^{h} 40·3^{m}, S 23° 38′. Bright cl. in a rich neighbourhood. H., 8-13 m^{s}.

2506 (H. VI 37) VII^{h} 55·2^{m}, S 10° 21′. Fine broad starry cloud, from 10 m^{s}. down to mere nebulosity; much better with 64 than higher powers. Vicinity gorgeous.

2539 (H. VII 11). VIII^{h} 6·0^{m}, S 12° 32′. Large loose cl. of stars, chiefly about 10 m^{s}., closely *np* 19, a 6 m^{s}. yel. (bright or.) star, attended by a fine group. 19 seems larger than 6 m^{s}. to my unaided eye.

ARIES.

Three stars near together mark it to the naked eye, but it reaches some way further E. into a dull region.

Double Stars.

Σ 145. 1^h $35{\cdot}7^m$, N 25° 14′ : 6·0, 10·6 : 31°·6 : 11″·3 : y., o.

1 (Σ 174). 1^h $44{\cdot}6^m$, N 21° 47′ : 6·2, 7·4 : 170°·5 : 2″·6 : gold, v. bl. Y., bl., '49. 80 just divides this beautiful pair : Perr., 167°·6, '83 : Bin.? 2° *np* *β*.

Σ 175. 1^h $45{\cdot}5^m$, N 20° 37′ : 8·2, 8·5 : 327°·9 : 10″·4 : v. w. Ha., 344°·8 : 15″·6, '87.

Σ 178. 1^h $46{\cdot}7^m$, N 10° 19′ : 7·8, 7·8 : 193°·3 : 3″·1 : w.

γ (Σ 180). 1^h $48{\cdot}0^m$, N 18° 49′ : 4·2, 4·4 : 359°·9 : 8″·6 : v. w., yw., '47. Some disagreement as to cols. Disc. by Hooke in following the comet of 1664. 'I took notice that it consisted of two small stars very near together; a like instance to which I have not else met with in all the heaven.' Good object for small telescopes. *β* doubles distant *comes*.

λ (OΣΣ 21). 1^h $52{\cdot}4^m$, N 23° 7′ : De., 4·7, 6·7 : 46°·2 : 37″·9 : w., olive or azure. Y., bsh., '48 : y., grnsh., '49. Whitley, 6·7, redsh. lilac, '63. Pointed at by γ and *β*.

Σ 194. 1^h $53{\cdot}7^m$, N 24° 21′ : 8, 8·3 : 264°·1 : 1″·2 : yw.

Σ 196. 1^h $54{\cdot}0^m$, N 20° 32′ : 8·5, 11, 9·2 : 55°·5, 167°·4 : 2″·4, 39″·5 : y., o., o. (*β*, 51°·7, 165°·1 : 2″·7, 34″·3, '80). Sm. distant 9 m^s.

Σ 200. 1^h $56{\cdot}0^m$, N 23° 37′ : 8·5, 9 : 124°·2 : 8″ : v. w.

10 (Σ 208). 1^h $58{\cdot}0^m$, N 25° 28′ : 6·2, 8·4 : 25°·2 : 2′ y., ash. (Ha., 53°·9 : 1″·1, '88). Bin. B. triplet in field *sf*. Between *α* Arietes and *α* Trian., nearest former.

Σ 212. 11^h $0{\cdot}6^m$, N 24° 38′ : 8, 8·5 : 165°·9 : 2″ : w.

[ARIES]

14 (OΣΣ 23). $11^h\ 3{\cdot}7^m$, N 25° 28′ : De., 4·9, 7·7 : 278°·5 : 106″·2 : w., w. azure. Sm. sees 10·5 m^s. (β 36°·7 : 93″·1). B. sees another *comes*, smaller, and more distant : Sa. adds a 4th est. 16 : 80° : 90″.

Σ 224. $11^h\ 5{\cdot}4^m$, N 13° 13′ : 7·5, 8 : 242°·4 : 5″ : yw., w.

Σ 237. $11^h\ 10{\cdot}2^m$, N 10° 20′ : 8·4, 8·7 : 238°·5 : 14″·6 : w.

Σ 240. $11^h\ 11{\cdot}6^m$, N 23° 25′ : 7·7, 8·2 : 48° : 4″·7 : w.

Σ 244. $11^h\ 11{\cdot}9^m$, N 21° 44′ : 8·8, 9 : 289°·8 : 4″·4 : w.

Σ 261. $11^h\ 19{\cdot}0^m$, N 11° 3′ : 8·6, 8·7 : 249°·2 : 3″ : yw.

Σ 271. $11^h\ 24{\cdot}8^m$, N 24° 48′ : 6·5, 11 : 180°·5 : 11″·9 : y., o.

Σ 273. $11^h\ 26{\cdot}5^m$, N 17° 56′ : 7·7, 8·7 : 358°·3 : 6″·9 : w.

30 (Σ I 5). $11^h\ 31{\cdot}2^m$, N 24° 13′ : 6·1, 7·1 : De., 273°·3 : 38″·6 : w., y. or azure. Y., blsh. grey, '50; y., pale lilac, '56. Main, equal, '63; De., 5·4, 6·6; Sa., not 1 m^s. diff., '74. Fr., not more than 0·5 m^s., '76. Main, both w., '63. Whitley, both grey, '68. 'The most S. of a group of about a dozen double stars, spread over the adjoining portions of three constell., Aries, Musca, and Triang., with extensive patches of dark and blank spaces between them.' Sm.

33 (Σ 289). $11^h\ 34{\cdot}8^m$, N 26° 38′ : 5·8, 8·7 : 359°·4 : 28″·5 : y., o. W., blsh., 8·7, very small, '50. In Musca.

Σ 291. $11^h\ 35{\cdot}5^m$, N 18° 23′ : 7·4, 7·7 : 119° : 3″·3 : w.

μ (β 522) $11^h\ 36{\cdot}7^m$, N 19° 35′ : 6, 12·5 : 263°·1 : 19″·2.

β 306. $11^h\ 38{\cdot}0^m$, N 25° 13′ : De., 6·4, 11·0 : 17°·3 : 2″·9.

Σ 305. $11^h\ 41{\cdot}8^m$, N 18° 57′ : 7·3, 8·2 : 330°·9 : 1″·6 : y. Ha., 318°·3 : 2″·8, '85.

π (Σ 311). $11^h\ 43{\cdot}7^m$, N 17° 3′ : 4·9, 8·4, 10·2 : 119°·3, 110°·1 : 3″·3, 25″·2 : yw., o., o. H., 10·2 brighter than 8·4, 1782. *Comites* not seen, '55; 9·5, 13, 9-in., '71. So Sa., '74. De., 5·5, 8·2, 11. Fr., 10·2 more like 13 or 14, '76.

ϵ (Σ 333). $11^h\ 53{\cdot}5^m$, N 20° 56′ : 5·7, 6·0 : 188°·9 : 0″·5 :

[ARIES]

w., '30 (K., 198°·4 : 1″, '66 : Ha., 201°·9 : 1″·3, '76, '88, "no motion in last 12 yrs."). Buffham divided, 4½-in. 'With' mirror, '69. Σ vars.?

Σ 338. 11^h $56·4^m$, N 10° 28′ : 8·2, 8·5 : 200°·3 : 20″·1 : w.

Σ 342. 11^h $59·1^m$, N 27° 32′ : 8·3, 8·8 : 306°·6 : 3″·1 : w.

52 (Σ 346). 11^h $59·6^m$, N 24° 52′ : 6, 6, 10·8 : 264°·5, 357°·2 : 0″·7, 5″·2 : w., w., o. : '32 (Perr., 270°·7, 356°·8 : 0″·5, 5″·5 : '83) : 6·5 notched, 450, 5½-in., '61. Sm., distant star; β 10·8 m^s. Close pair Bin.?

Σ 376. 11^h $14·6^m$, N 19° 22′ : 7·9, 8 : 351°·2 : 6″·8 : v. w.

66 (β 878). 11^h $22·6^m$, N 22° 28′ : 6, 12·2 : 78°·0 : 1″·1.

Stars with Remarkable Spectra and Variables.

S (var.). 1^h $59·2^m$, N 12° 3′ : 9·1–9·8 to 14? : Per., $292·2^d$. Peters.

R (var.). 11^h $10·4^m$, N 24° 35′ : 7·6–9·0 to 11·7–13·0 : Per., $186·7^d$. Argelander.

T (var.). 11^h $42·7^m$, N 17° 6′ : 7·9–8·6 to 9·3–9·7 : Per. 313^d Auwers.

ρ. 11^h $50·2^m$, N 17° 56′ : 6 : III. Vogel.

U (var.). 111^h $5·5^m$, N 14° 24′ : 7·8 below 11? Period unknown. Schaeberle.

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The leader of this beautiful constellation, Capella (v^h $9·3^m$, N 45° 54′), is very brilliant. h. and Σ think it has increased. h. classed it decidedly above Wega in 1847, otherwise than he had formerly, and, therefore, second in the heavens. So Galle and Heis; with me, Wega takes precedence; but the objects are distant, and differ in colour, w. and sapphire, and, as Sm. observes, this difference may influence

estimates of size. Ptolemy, El Fergani (10th cent.), and Riccioli, have all called Capella *red.* Its parallax, as deduced by OΣ, shows amazing distance, far exceeding that of some smaller stars, and requiring nearly 11 y. for the transmission of its light to us. Peters, however, prefers 70 y.

Double Stars.

Σ 572. $4^h\ 32{\cdot}3^m$, N 26° 45′ : 6·5, 6·5 (vars) : 210°·3 : 3″·2 : ysh. : '30. Ha., 201°·6, '90.

Σ 577. $4^h\ 35{\cdot}5^m$, N 37° 20′ : 7·7, 7·7 : 278°·7 : 1″·6 : w. Ha., 75°·6, '90.

Σ 603. $4^h\ 46{\cdot}6^m$, N 49° 25′ : 8, 8·2 : 238°·6 : 8″·4 ; v. w.

Σ 613. $4^h\ 51{\cdot}6^m$, N 43° 59′ : 7·7, 8·7, 11·7 : 106°·6, 18°·8 : 19″·8, 15″·8.

ω (Σ 616). $4^h\ 52{\cdot}5^m$, N 37° 44′ : 4, 7·9 : 351°·9 : 6″·5 : grnsh, blsh. w. W., ruddy, '50 : an unusual combination, plainer with 80 than 250; so Fr., '77.

5 (OΣ 92). $4^h\ 53{\cdot}4^m$, N 39° 15′ : 6, 9·7 : 230°·1 : 2″·8 : ysh. o. (Ha., 250°·7, '90). Bin.

Σ 619. $4^h\ 53{\cdot}6^m$, N 50° 7′ : 8·7, 8·7 : 106° : 5″·4 : w. De., 115°·3, '68. Bin.

Σ 621. $4^h\ 53{\cdot}7^m$, N 39° 3′ : 9, 9 : 131°·4 : 9″·8 : o.

Σ 623. $4^h\ 53{\cdot}7^m$, N 27° 11′ : 6·8, 8·3 : 205°·1 : 20″·4 : v. w., w.

9 (β 1046). $4^h\ 58{\cdot}8^m$, N 51° 29′ : 5·5, 12·7 : 93°·8 : 6″·3.

Σ 645. $5^h\ 3{\cdot}5^m$, N 27° 54′ : 6·2, 8·2 . 26°·8 : 11″·7 w. ash. β *comes* double : 8·7, 9·2 : 75°·3 : 0″·4.

Σ 644. $5^h\ 3{\cdot}5^m$, N 37° 11′ : 6·7, 7 : 219°·2 : 1″·6 : gold, blsh. red; remarkable and constant cols. De., green, red. *p* is cl., 1778.

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Σ 648. v^h 4·5^m, N 31° 55′ : 7·4, 8·1 : 74°·3 : 4″·7 : ysh. blsh.

14 (Σ 653). v^h 8·8^m, N 32° 35′ : 5, 7·2, 11 : 225°·5, 342°·4 14″·6 : 12″·6 : grnsh., blsh. w., o. Pale y., lilac, '50. So Fr., '77. 11 pretty steady 9½-in. spec., glimpsed by Miss Mitchell, 5-in. achr., '61. Perr., 349°·8 : 11″·7 : 8 ; red ; '85.

Σ 666. v^h 10·5^m, N 33° 14′ : 8, 8 : 71°·3 : 3″ : v. w.

Σ 657. v^h 10·8^m, N 52° 45′ : 7·5, 8 : 273°·9 : 1″·4. β 280°·2 : '78.

Σ 669. v^h 11·6^m, N 45° 9′ : 7·8, 8·3 : 275°·5 : 9″·7 : v. w.

16 (OΣ 103). v^h 11·6^m, N 33° 17′ : 5·2, 11 : 56°·6 : 4″·5 : y., o. Wa. glimpsed with 4$\frac{3}{10}$-in. achr. Es., seen 5-in. Es., pair 12 sec. *f*, 10′, *n*, 7·5, 9 (β 10°·5 : 14″ :) a distant *comes* 13 (β est. 169°·2 : 78″) is double (β 11·5, 11·5 est. 5″). Another nearer *comes*.

Σ 687. v^h 15·7^m, N 33° 42′ : 8·2, 9, 9·2 : 67°·6, 153°·5 : 17″·2, 48″·7 : o. Es., pale or., 2 bl. (β 9·2 double : 246°·9 : 0″·9). 27 sec. *f*, 23′ *s* is β 887, 9, 10·5, 12 : 194°·3, 332°·8 : 1″, 10″·6. Bird, miniature of Orion's belt, with little triangle *s*.

σ (β 888). v^h 17·9^m, N 37° 17′ : 6, 12 : 171° : 7″·9.

Σ 698. v^h 18·6^m, N 34°·46′ : 6·2 7·7 : 346°·2 : 31″·1 : y., blsh. Beautiful.

Σ 699. v^h 18·8^m, N 37° 58′ : 7·3, 8 : 342°·9 : 8″·8 : v. w.

Σ 706. v^h 19·9^m, N 30° 15′ : 8·2, 9·3 : 36°·8 : 3″·7 : w.

Σ 718. v^h 24·6^m, N 49° 19′ : 7·2, 7·2 : 74°·2 : 7″·8 : v. w.

Σ 737. v^h 29·9^m, N 34° 3′ : 8·2, 8·5 : 305° : 10″·7 : w.

Σ 736. v^h 30·0^m, N 41° 46′ : 7·2, 8·5 : 342°·4 : 2″ : w., blsh. De., 348°·6, '66. Bin ?

26 (Σ 753). v^h 32·2^m, N 30° 26′ : 5·8, 8·0 : 268°·0 : 12″·3 y., blsh. Y., violet, '50. β doubles 5·8 : 5·6, 6·0 : 344°·4 :

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0″·15. Morton, *comes* 14 m^s., also β (112°·7 : 32″·3 : 11 m^s.) Du., 4th fainter. 3° *n f* β Tauri.

Σ 764. v^h 35·0^m, N 29° 27′ : 6·3, 6·8 : 13°·8 : 25″·9 : v. w. Es., yw., blsh.

Σ 778. v^h 37·6^m, N 30° 53′ : 7·7, 9 : 185°·8 : 3″·2 : yw., o.

Σ 791. v^h 43·1^m, N 39° 33′ : 8·7, 9·3 : 90°·2 : 4″·9 : w.

Σ 796. v^h 43·4^m, N 31° 45′ : 6·9, 8 : 61°·2 : 3″·6 : w., blsh. w.

Σ 799. v^h 45·3^m, N 38° 32′ : 7·2, 8·3 : 192°·5 : 1″·1 : w.

Σ 802. v^h 45·5^m, N 40° 9′ : 7·9, 8·5 : 108°·7 : 3″·2 : v. w.

Σ 805. v^h 45·5^m, N 28° 26′ : 7·7, 8·4 : 48°·4 : 12″·1 : w.

Σ 808. v^h 46·3^m, N 29° 45′ : 8·5, 8·5 : 57°·4 : 16″. De., *comes* 11·6 : 165°·7 : 2″·9.

β. v^h 52·2^m, N 44° 57′ : Spectroscopic Binary discovered at Harvard (see section on photography). 19 sec. *f* 30′ *s* is a fine pair : H*h*., 209 : Es., 7·1, 9·6 : 328°·0 : 32″·8 : v. orange, v. bl., 2^m 30^s *p* β 32′ *n* is a red : 8·5 (Es., 314).

θ (OΣ 545). v^h 52·9^m, N 37° 13′ : 3, 7·5 : 5°·6 : 2″·1 : 2 minute *comites*.

Σ 825. v^h 54·9^m, N 36° 30′ : 7·8, 9 : 146°·2 : 8″·2 : w.

Σ 834. v^h 58·2^m, N 30° 15′ : 8, 8·8 : 307°·9 : 22″·9 : w.

β 893. v^h 58·2^m, N 37° 58′ : 6·2, 12·5 : 128°·0 : 17″·6.

β 1057. vi^h 0·0^m, N 29° 32′ : 6·3, 11·2 : 209°·5 : 9″·9.

41 (Σ 845). vi^h 3·9^m, N 48° 44′ : 5·2, 6·4 : 353°·1 : 8″ : v. w. *Comes* tawny or violet, '52. Relatively fixed, c.p.m., a not infrequent phenomenon.

Σ 861. vi^h 5·1^m, N 30° 46′ : 8·2, 8·2 : 318°·2 : 1″·6 : w. Trip, 7·8 : 14°·7 67″·1. Seabroke doubles A (69°·1 : 0″·5) and finds 16°·8 : 65″·2 for 7·8, '84.

Σ 872. vi^h 8·9^m, N 36° 12′ : 6, 7 : 217°·4 : 11″ : w : '28. Pale y., pale lilac, '72; so Fr., '77. De., w., '65.

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Σ 883. VI^h 12·1^m, N 39° 48′ : 8·2, 8·7, 10·4 : 263°·4, 257°·8 : 3″·3, 28″·7.

Σ 884. VI^h 13·1^m, N 47° 10′ : 8·5, 8·5 : 270° : 9″ : v.w.

Σ 888. VI^h 13·8^m, N 28° 28′ : 7·5, 9·2 : 246°·2 : 2″·7 : v. w. ash. β 7·5, double 146°·0 : 0″·2.

Σ 896. VI^h 17·8^m, N 51° 56′ : 8·3, 8·7 : 82°·3 : 20″ : w.

Σ 906. VI^h 22·0^m, N 37° 28′ : 8·3, 9·5 : 335°·9 : 6″·6 : w., o.

Σ 918. VI^h 26·0^m, N 52° 33′ : 6·7 7·7 : 322°·4 : 4″·4 : w. Bin.

Σ 928. VI^h 27·9^m, N 38° 37′ : 7·4, 8 : 134°·4 : 3″·4 : yw., w. Es., y., grnsh.

Σ 929. VI^h 28·5^m, N 37° 47′ : 7·1, 8·2 : 24″·6 : 6 : ysh., v. bl. Es., between Σ 928, Σ 929, a beautiful triangle, 6·5 ysh., 8·5, 9 v. bl., *np* is Es-Birm., 192 ; 6·3 : red. A little *f* red is Σ 940 : 8, 10 : 293°·2 : 10″·1 : w., o.

Σ 933. VI^h 29·8^m, N 41° 12′ : 8, 8·5 : 74°·7 : 25″·6 : v. w.

Σ 941. VI^h 31·6 : N 41° 40′ : 7, 8 : 77°·6 : 1″·9 : blsh. w., purpsh. w. Fl., fine red, bl. De., w., ash : '74. Seabroke 80°·8 : '84 : Bin.

Σ 945. VI^h 33·3^m, N 41° 5′ : 7·1, 8 : 249° : 1″·1 : w. Ha., 267°·2 : 0″·8, '91.

54 (OΣ 152). VI^h 33·3^m, N 28° 21′ : 6, 7·8 : 40°·2 : 0″·9 : ysh., grn.

56 (OΣΣ 78). VI^h 39·5^m, N 43° 40′ : De., 5·5, 8·0 : 21°·4 : 48″·2. Y., lilac, '51.

Σ 964. VI^h 43·2^m, N 43° 54′ : 8·3, 9 : 195°·5 : 1″·7 : w.

Σ 979. VI^h 49·2^m, N 46° 41′ : 8, 8·8 : 209°·7 : 7″·4 : v. w. Bird 8·8 down to 9·5, v. bl. De., 8, 9.

Σ 994. VI^h 52·8^m, N 37° 14′ : 7·2, 7·5 : 56°·8 : 25″·6 : v. w. Es., *comes* 12, 220°·9 : 9″·1.

Σ 1012. VI^h 58·6^m, N 28° 17′ : 8·2, 8·7 : 167°·4 : 12″·7 : o.

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65 (β 901). VII^h 15·4^m, N 36° 57′ : 5·8, 12·3, 12·7 : 7·9°, 26·8° : 10″·6, 36″·0.

Stars with Remarkable Spectra and Variables.

Es-Birm. 98. IV^h 42·6^m, 34° 49′ : 8·8 : R. : IV : Es.

Es-Birm. 102. IV^h 45·8^m, N 38° 20′ : 8·8 : R. : IV : Es.

Es-Birm. 107. IV^h 53·5^m, N 39° 30′ : 6·8 : R. : B. III : Es.

ϵ (var.). IV^h 54·8^m, N 43° 40′ : 3 to 4·5 : Irreg. Fritsch.

Es-Birm. 110. IV^h 56·5^m, N 38° 56′ : 9·5 : R. : IV : Es.

R (var.). V^h 9·2^m, N 53° 28′ : 6·5–7·8 to 12·5–12·7. Per. 460·6^d : At Bonn.

Es-Birm. 123. V^h 11·4^m, N 42° 41′ : 9·0 : yr. : III : Du.

Es-Birm. 125. V^h 12·5^m, N 35° 41′ : 8·9 : R. : IV : Es.

Es-Birm. 130. V^h 15·3^m, N 32° 24′ : 9·3 : R. : IV : var.? Es.

S (var.). V^h 20·5^m, N 34° 4′ : 9·4–11, below 14·5. Irreg. IV : Du.

Es-Birm. 137. V^h 20·8^m, N 29° 50′ : 8·0 : R. : III? Es.

T (Nova). V^h 25·5^m, N 30° 22′ : Nova disc. by Dr. Anderson, January, '92. Reaching 4 m^g. and declining to 16 in April, showing compound spectrum of many bright lines flanked by dark ones, various explanations of which have been attempted, astronomers generally favouring the idea of the revolution of two bodies. In August, Corder found it had revived to 9 m^g., and Es. found nebula spectrum, while Barnard, with the 36-in. at the Lick Observatory, sees it as a planetary nebula, thus opening up a wide field of speculation, for hitherto planetary nebulæ have been considered to be forms of condensation leading eventually to a star, but now it seems possible that they mark outbursts like the Nova.

U (var.). V^h 35·5^m, N 31° 59′ : 8·6 to 12 : 397^d. Es.

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Es-Birm. 156. v^h 41·3^m, N 44° 48′ : 9·2 : R. : IV? Es.

Es-Birm. 158. v^h 41·7^m, N 30° 36′ : 8·5 : R. : D'A. IV : var. : Es.

π. v^h 52·5^m, N 45° 56′ : 4·8 : R. : III : Se.

Es-Birm. 177. vi^h 10·7^m, N 33° 14′ : 9·1 : R. : III? Es.

V (var.). vi^h 16·5^m, N 47° 43′ : 8·5–10 below 11·5 : Per. 315^d? IV : Es.

Es-Birm. 192. vi^h 29·7^m, N 38° 32′ : 6·3 : R. : Hist. Cél., IV, magnificent. Se.

Clusters, Nebulæ, and Groups.

Fine Field. v^h 12·1^m, N 40° 2′, including λ 5 m^s. Wa.

1857 (H. VII 33). v^h 13·2^m, N 39° 14′. Splendid region.

19. v^h 13·4^m, N 33° 52′. Grand large field.

1907 (H. VII 39). v^h 21·4^m, N 35° 14′ : D'A., very large cl. of minute stars arranged in curves.

1912 (M. 38). v^h 22·0^m, N 35° 45′. Noble cl. arranged as oblique cross: pair of larger stars in each arm; brighter star in centre; not brighter than pairs '71, '77. Larger stars dot it prettily with open doubles. Glorious neighbourhood.

1931 (H. I 261). v^h 24·8^m, N 34° 10′. Haze surrounding 4 minute stars, 9½-in. spec., '73, '76. H., 3 only in 3 obs. D'A., 5; E. of Rosse, 6, oval with branches.

1960 (M. 36). v^h 29·7^m, N 34° 4′. Beautiful assemblage of stars 8 to 14 m^s., very regularly arranged. 2° *f* ϕ.

2099 (M. 37). v^h 45·7^m, N 32° 31′. Sm. calls this "a magnificent object;" the whole field being strewed, as it were, with sparkling gold-dust; and the group is resolvable

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into about 500 stars, from 10 to 14 m^{s}., besides the outliers. Even in smaller instruments extremely beautiful, one of the finest of its class. Gaze at it well and long. K. notices a brighter star near centre, Burton : ruby : 10, Es. : 9·0 : pale red. All the stars in the mass must be nearly at the same distance from us, and consequently their real sizes must be different. The aspect of the Nubecula Major in the S. hemisphere convinced h. of this; it is ocular proof of the incontrovertible, though long discredited fact, that the apparent brightness of stars has very little connection with their distance from the Earth. E. of Rosse, wonderful loops and curved lines of stars, first remarked by D'A.

BOÖTES.

A fine constellation, of which the leader, Arcturus (XIV^{h} 11·1^{m}, N 19° 44′), is placed next to Sirius and before Wega, by H. and h.; Seidel gives Wega precedence. Fletcher has rated it alternately above and below Capella. (The Harvard Photometric Results give the magnitudes of these bright stars as Sirius — 1·43; Arcturus, 0·03; Capella, 0·18; Wega, 0·19.) A noble object at all times, but never so interesting as when enveloped in the tail of Donati's comet, 1858, Oct. 5, and only 20′ from the nucleus, it flashed out so vividly its superiority. Sm. calls it reddish yel.; it is golden yel. to me. Schm. thought it had of late years lost all redness and was growing paler. Spect. II type. The first star seen in daytime by Morin, 1635; it is stated, however, that Galileo saw stars by day. Schm. has seen it, *with the naked eye*, 24^{m} before sunset. Stone finds its heating power perceptible and considerably greater than that of Wega, which, however, can be detected. Huggins gives its

heat equal to that of Regulus, and ½ greater than that of Sirius; Castor showing none. Arcturus has a great annual proper motion of more than 1″ RA, and nearly 2″ Dec.: so that, as Humbolt says, it has moved 2½ times the Moon's diam. since the days of Hipparchus. Yet its parallax is almost insensible; so that, according to Peters, we wait for its light more than 25 y. How inconceivable, then, must be its dimensions and its speed! Besides this motion, Huggins finds with the spectroscope that it is approaching us at the rate of 55 miles per second! Boötes is rich in pairs, poor in clusters and nebulæ.

Double Stars.

β 612. XIII^h 34·7^m, N 11° 15′ : 6·4, 6·5 : 56°·1 : 0″·2, '78 : 191°·1, '91. Rapid Bin.

1 (Σ 1772). XIII^h 35·9^m, N 20° 28′ : 6·2, 9·1 : 148°·7 : 4″·8 : blsh, w., v. bl. A 7 m^s. blsh., and Fl. another bl., in field.

τ (OΣ 270). XIII^h 42·5^m, N 17° 57′ : 4·8, 11·4 : 347°·8 : 10″·3 : grnsh w., o. Ha., 352°·9 : 9″ : '84. Bin? 11·4 var.? Wa., $4\frac{3}{10}$-in. achr. Sa., easy 6½ in. spec., and fine lilac.

Σ 1785. XIII^h 44·6^m, N 27° 29′ : 7·2, 7·5 : 164°·4 : 3″·5 : w., '30. K., v. pale y., blsh., '71; so Fr., '76. Ha., 240°·7 : 1″·5, '90. Rect. Mot.

OΣΣ 126. XIII^h 45·7^m, N 21° 47′ : De., 6·3, 6·8 : 208°·4 : 85″·9 : w., y. Some diff. in col., '52; 9 in. spec., ysh., blsh. w.? but very little in m^s., each about 7; *f* the larger, '72. Fr., slight diff., '76. 6, a fine y. 5 m^s. in field.

Σ 1793. XIII^h 54·5^m, N 26° 18′ : 7, 8 : 242°·3 : 4″·4 : w., blsh.

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Σ 1794. XIII^h 55·1^m, N 20° 22′ : 8·5, 8·7 : 129°·8 : 2″ : ysh.

Σ 1797. XIII^h 57·2^m, N 19° 54′ : 8·2, 8·5 : 160°·2 : 21″·1 : w.

Σ 1804. XIV^h 3·6^m, N 21° 40′ : 8, 9 : 18°·3 : 4″·4 : w., bl.

Σ 1808. XIV^h 5·6^m, N 27° 5′ : 8, 9 : 68°·8 : 2″·8 : w. Ha., 74°·4, '87.

Σ 1810. XIV^h 7·1^m, N 28° 30′ : 8·4, 9 : 173°·8 : 1″·8 : w.

Σ 1814. XIV^h 7·4^m, N 50° 43′ : 8·5, 9 : 256°·2 : 11″ : w.

Σ 1813. XIV^h 8·4^m, N 5° 52′ : 8, 8·1 : 191° : 4″·8 : w.

Σ 1816. XIV^h 9·5^m, N 29° 34′ : 7, 7·1 : 80°·2 : 1″·9 : ysh.

Σ 1817. XIV^h 9·7^m, N 27° 10′ : 8, 8·6 : 7° : 1″·6 : w.

κ (Σ 1821). XIV^h 9·9^m, N 52° 16′ : 5·1, 7·2 : 237°·7 : 12″·6 : grnsh., blsh. Pale y., blsh., '50. De., 4·5, 6·6, '67.

Σ 1826. XIV^h 11·4^m, N 47° 26′ : 8·2, 9·2 : 315°·1 : 4″·4 : w., o.

Σ 1829. XIV^h 11·8^m, N 50° 54′ : 7·7, 8·2 : 150°·3 : 5″·3 : w.

Σ 1825. XIV^h 11·9^m, N 20° 35′ : 6·8, 8·5 : 185°·7 : 3″·4 : w., o., '30. Fr. 8·5, ruddy or dusky, '76. Ha., 175°·2 : 4″·2, '84, *f a*, 1° *n*.

Σ 1828. XIV^h 12·2^m, N 24° 37′ : 9·2, 9·2 : 160°·1 : 1″·9 : o.

ι (Σ I 26). XIV^h 12·7^m, N 51° 50′ : 4·9, 7·5 : De., 33°·2 : 38″·1 : yw. Wy., lilac, '50. D., 7·5, purple, '48. Wa., minute *comes s.* c.p.m.

Σ 1834. XIV^h 16·6^m, N 48° 57′ : 7·1, 7·2 : 113°·7 : 1″·4 : o, o., '31. Ha., 118°·6 : 0″·4, '85.

Σ 1839. XIV^h 18·1^m, N 54° 21′ : 8·3, 8·3 : 261°·9 : 14″·4 : v. w.

Σ 1835. XIV^h 18·5^m, N 8° 53′ : 5·5, 6·8 : 186°·5 : 6″·1 : grsh. w., blsh. w. De., 4·8, 6·8, '53, '55; 5·7, 7·0, '66; Du., 4·5, 6·5, '69; P., 8·9 for 6·8; Perr., 4·3, 6·5, '85. W., pale y., sometimes bl., more usually tawny, '54; 9 in., '72 : an uncertainty of hue, which I have found troublesome in the

smaller components of some pairs. Great diversity as to colours in both components. *β comes* double, 8·4, 8·4; 135° : 0″·2.

Σ 1838. XIV^h 19·2^m, N 11° 41′ : 7·2, 7·3 : 333°·4 : 8″·9 : w.

Σ 1843. XIV^h 21·0^m, N 48° 17′ : 7·2, 8·7 : 188°·1 : 20″·1 : w., o.

θ. XIV^h 21·8^m, N 52° 19′ : 4, 12 : est. 170° : 60″ : Wa.

Σ 1850. XIV^h 24·1^m, N 28° 44′ : 6·1, 6·7 : 262°·2 : 25″·7 : vw., '33. Pale y, pale bl., 9 in. spec. '72; so Fr., '76.

Σ 1855. XIV^h 28·1^m, N 32° 5′ : 8·2, 9·1 : 248°·6 : 15″·3 : w.

Σ 1858. XIV^h 29·5^m, N 36° 1′ : 7·2, 8 : 35°·2 : 2″·2 : w.

Σ 1861. XIV^h 31·9^m, N 12° 36′ : 8·7, 9·2 : 175°·5 : 14″ : o. *β* minute *comes*, 301°·3 : 30″.

π (Σ 1864). XIV^h 36·0^m, N 16° 51′ : 4·9, 6 : 99°·2 : 5″·8 : v.w. Maw, 102°, 7″, '88. 6 a little tawny or ruddy, '50. Bin?

ζ (Σ 1865). XIV^h 36·4^m, N 14° 9′ : 3·5, 3·9 : 309°·1 : 1″·2 : w., '30. Sch., 293°·4 : 0″·5, '87. Pale y., '54. Σ alternately var.; so Se. Elong., '54 : wide 9½-in. spec., '69. Bin?

Σ 1867. XIV^h 36·5^m, N 31° 43′ : 7·7, 8·2 : 21°·8 : 1″·6 : w. Ha., 16°·1, '85.

Σ 1871. XIV^h 38·3^m, N 51° 50′ : 7·7 : 283°·2 : 1″·8 w. Ha., 292°·7, '91. Bin.

Σ 1874. XIV^m 38·7^m, N 49° 33′ : 7·7, 9·2 : 288°·4 : 25″·7 : y, o.

Σ 1875. XIV^h 39·2^m, N 38° 10′ : 8·7, 9·2 : 310°·7 : 3″·2 : w.

Σ 1873. XIV^h 39·9^m, N 8° 7′ : 7·8, 8·3 : 94°·4 : 6″·3 : v. w. Ysh., blsh., '71.

ε (Σ 1877). XIV^h 40·6^m, N 27° 30′ : 3, 6·3 : 321°·0 : 2″·6 :

[BOÖTES]

v. y., v. bl. Maw, 327°·5, '89. Light y., grnsh., '50. Se. 'most beautiful y., superb bl.' This 'lovely object,' as Sm. calls it, is probably bin. of long per. : a well-known test for moderate telescopes. Buffham has split it with $1\frac{7}{8}$ in. of 9 in. 'With' spec. I have seen it perfectly with $2\frac{1}{2}$ in. achr. 80 of $3\frac{7}{10}$ in. divided it.

Σ 1883. XIV^h 43·9^m, N 6° 22′ : 7, 7 : 272° : 1″·2 : ysh. : '30. Ha., 251°·6 : 0″·7, '86. Not equal, '72. Bird, a solitary object. Bin.

Σ 1884. XIV^h 44·0^m, N 24° 47′ : 6·2, 7·8 : 52°·2 : 1″·2 : ysh., blsh : '29. D., w., brownish, '48.

Σ 1886. XIV^h 46·2^m, N 10° 8′ : 7·2, 9·2 : 228°·2 : 7″·5 : yw., o.

39 (Σ 1890). XIV^h 46·3^m, N 49° 7′ : 5·8, 6·5 : 44°·1 : 3″·7 : w., certainly purpsh. Both w., '50. So De.

ξ (Σ 1888). XIV^h 46·8^m, N 19° 31′ : 4·7, 6·6 : 334°·2 : 7″·2 : y., purpsh. red. Ha., 242°·4 : 3″·2, '91. Clear y., reddish purp., '50. De., y., r., '63 to '77. Bin. Do., 127·35^y. β beautiful pair 1 m. *f*, 23′ *s* disc. by A. G. Clark : 8·4, 9·7 : 190°·3 : 1″·4, *comes* 12·2 : 162°·7 : 9″·0. Bin.

OΣ 288. XIV^h 48·7^m, N 16° 7′ : 6·4, 7·1 : 230°·3 : 0″·7. Maw, 192°·5 : 1″·5. Bin?

OΣ 289. XIV^h 51·9^m, N 32° 43′ : 6·3, 9·8 : 120°·2 : 4″·9. Ha., 114°·9, '86.

Σ 1895. XIV^h 53·7^m, N 40° 33′ : 7·8, 8·3 : 43°·4 : 12″·4 : v. w.

44 (Σ 1909). XV^h 0·5^m, N 48° 2′ : 5·2, 6·1 : 234°·1 : 2″·9 : ysh., blsh., '32. Ha., 241·5 : 4″·9, '91. Y., ruddy or purpsh., '50. Fletcher, w., y., '51. Miller, w., y., '53. Great diff. as to cols. Σ and A. have found var. light here. Bin. Do. 261·1 y.

Σ 1907. XV^h 0·8^m, N 12° 1′ : 8·5, 9·7 : 11°·8 : 1″·1 : o.

[BOÖTES]

Σ 1908. xv^h 0·9^m, N 34° 51′, 8·2, 9·2 : 137°·2 : 1″·5 : w., o. Ha., 144°·7 : 1″·5, '87. Bin.

47 (β 1086). xv^h 2·2^m, N 43° 32′ : 5½, 13·2 : 256°·6 : 6″.

Σ 1910. xv^h 2·7^m, N 9° 36′ : 7·0, 7·0 : 209°·2 : 4″ : yw.

Σ 1916. xv^h 6·1^m, N 39° 21′ : 7, 9·5 : 329°·6 : 10″ : yw., o.

Σ 1917. xv^h 7·9^m, N 15° 45′ : 9, 9·3 : 239°·3 : 2″·2 : o.

Σ 1920. xv^h 7·5^m, N 47° 14′ : 8·5, 8·5 : 291°·1 : 19″ : yw.

Σ 1921. xv^h 8·2^m, N 39° 3′ : 7, 7·2 : 283°·7 : 30″·3 : w.

Σ 1919. xv^h 8·3^m, N 19° 39′ : 6·1, 7 : 10°·2 : 24″·8 : yw., w. Pale y., pale bl., '83.

Σ 1923. xv^h 9·1^m, N 14° 49′ : 8·5, 9·2 : 12°·5 : 4″·8 : y., o.

Σ 1926. xv^h 11·1^m, N 38° 40′ : 6·1, 8·4 : 260°·6 : 1″·6 ysh., bl. β 257°·7 : 1″·1, '89.

δ (Σ I 27). xv^h 11·5^m, N 33° 42′ : 3·2, 7·4 : De., 78°·8 105″·1. Bright y., fine bl., '50. B., among pairs and triplets.

Σ 1934. xv^h 13·9^m, N 44° 9′ : 8·5, 8·5 : 45°·1 : 5″·3 : w. Maw, 31°·2 : 6″·6, '89.

μ^1 (Σ I 28). xv^h 20·7^m, N 37° 43′ : 4, 6·5 : 171°·9 : 108″·5, companion μ^2 (Σ 1938) 6·7, 7·3 : 327°·0, 1″·4 : grnsh. w. Maw, 97°·8 : 0″·7, '89. Bin. Per., 280·29 yrs. Do. Probably all one system, as Σ finds c.p.m.

Stars with Remarkable Spectra and Variables.

T (Nova?). xiv^h 9·4^m, N 19° 32′ : one appearance, 9·7. Baxendell.

X (var). xiv^h. 19·4^m, N 16° 46′ : 9–9·4 to 10·2. Per., 121·5^d. Baxendell.

S (var). xiv^h 19·5^m, N 54° 16′ : 7·7–8·5 to 12·5–13·2. Per., 274·0^d. At Bonn.

[BOÖTES]

Es-Birm. 401. XIV^h 19·7^m, N 21° 55′ : 8·2 : pale r., Lindemann. III Es.

Es-Birm. 402. XIV^h 19·7^m, N 26° 10′ : 8·0 : h., R. D'A. III. Es. var.

(Var). XIV^h 22·2^m, N 5° 2′ : 8. Unknown. At Harvard (in Virgo).

V (var). XIV^h 25·7^m, N 39° 18′ : 6·9–7·3 to 9·2–10·5. Per., 256^d. Du.

R (var.). XIV^h 32·8^m, N 27° 10′ : 5·9–7·8 to 11·3–12·2 : Per., 223·4^d. At Bonn.

Es-Birm. 411. XIV^h 35·1^m, N 32° 58′ : 8·2 : R. : III. Es.

Es-Birm. 414. XIV^h 37·0^m, N 31° 59′ : 8·0 : R. : III. var. Es.

Es-Birm. 416. XIV^h 41·6^m, N 15° 33′ : 5·5. III: D'A.

U (var.). XIV^h 49·7^m, N 18° 6′ : 9·1–9·3 to 12–13·6 : Per., 173·8^d. Baxendell.

Cluster and Nebula.

5466 (H. VI 9). XIV^h 0·9^m, N 29° 0′. Faint white cloud. 5′ to 6′ in diam. h. stars 11. m^s.

5820 (H. II 756). XIV^h 55·7^m, N 54° 17′ : Faint: guide to 7·5 m^s. pair *f*, from which a straight line of small stars extends.

CAMELOPARDUS.

Wide-spread, but obscure; containing many good objects.

Double Stars.

Σ 349. III^h 2·4^m, N 63° 25′ : 7·4, 8·1 : 319°·8 : 6″·1 : w.

Σ 362. III^h 8·3^m, N 59° 40′ : 7·7, 8 : 142°·3 : 6″·9 : v.w. (D., quintuple.) In beautiful wide group.

[CAMELOPARDUS]

OΣ 52. 11^h $8{\cdot}8^m$, N 65° 17′ : 6·4 7·0 : 151°·4 : 0″·5 : w. De., 136°·8, '68.

Σ 368. 11^h $12{\cdot}3^m$, N 68° 8′ : 8·5, 8·5 : 342°·1 : 2″·3 : w.

Σ 374. 11^h $15{\cdot}0^m$, N 67° 6′ : 7, 8·5 : 294°·7 : 10″·8 : w., ash.

Σ 386. 11^h $20{\cdot}3^m$, N 54° 49′ : 8·8, 8·8 : 58°·8 : 2″·5 : w.

Σ 384. 11^h $20{\cdot}4^m$, N 59° 33′ : 7·8 : 9 : 267°·5 : 2″ : gold, bl.

Σ 385. 11^h $21{\cdot}0^m$, N 59° 36′ : 4·7, 9 : 161°·4 : 2″·4 : y., o.

Σ 389. 11^h $22{\cdot}1^m$, N 59° 1′ : 7, 8 : 61°·8 : 2″·8 : w., purpsh. Es., 66°·5, '91.

Σ 390. 11^h $22{\cdot}4^m$, N 55° 6′ : 4·8, 9·2 : 159°·6 : 15″ grnsh. w., o. Pale ruby, 7·5, *s f.*

Σ 396. 11^h $25{\cdot}5^m$, N 58° 26′ : 6·3, 8 : 241°·8 : 20″·4 : w. Es., 243°·6, '91.

Σ 400. 11^h $26{\cdot}7^m$, N 59° 42′ : 7, 8 : 282°·6 : 1″·5 : yw., blsh. w. Ha., 315°·9 : 0″·6, '89. Bin.

OΣΣ 36. 11^h $31{\cdot}2^m$, N 63° 34′ : De., 6·3, 7·3 : 70°·2 : 45″·8 : w., y. Es., pale y., pale or.

OΣΣ 37. 11^h $31{\cdot}4^m$, N 44° 28′ : De., 6·2, 6·5 : 95°·0 . 41″·2 : w. Es., ysh., blsh.

P. III. 97. 11^h $34{\cdot}5^m$, N 59° 39′ : 6, 9 : K., 34°·3 : 55″·6. Orange with scarlet glare, bl. Es., *comes*, 13·8 : 96°·2 : 18″·7; another : 13 : 35°·7 : 55″.

OΣΣ 39. 11^h 41 3^m, N 56° 49′ : De., 5·9, 6·6 : 74°·8 : 58″·6. Es., blsh., ysh.

Σ 445. 11^h $42{\cdot}3^m$, N 59° 50′ : 8·2 9·2 : 253°·2 : 3″ : w.

OΣ 67. 11^h $48{\cdot}6^m$, N 60° 50′ : 5, 8·2 : 39°·3 : 1″·7 : gold, grn. Seabroke, 45°·4, '84.

Σ 480 11^h $56{\cdot}5^m$, N 55° 28′ : 8·3, 8·5 : 324°·2 : 3″·2 : ysh.

Σ 485. 11^h $59{\cdot}1^m$, N 62° 5′ : 6·1, 6·2 : 303°·3 : 18″ : w.,

[CAMELOPARDUS]

blsh. w. In field is Σ 484 : 9, 9·5 : 132°·4 : 5″·4 : o. Trip; 9 : 324°·3 : 22″·6.

Σ 474. IIIʰ 59·4ᵐ, N 75° 59′ : 8·5, 8·5 : 145°·4 : 22″·6 : w.

Σ 490. IVʰ 2·0ᵐ, N 59° 54′ : 8·5, 9 : 55°·7 : 4″·6 : w.

Σ 503. IVʰ 7·9ᵐ, N 63° 56′ : 8·8, 8·8 : 226°·7 : 4″·3 : w.

Σ 522. IVʰ 14·8ᵐ, N 51° 22′ : 8·5, 8·5 : 37°·8 : 1″·5 : o.

Σ 526. IVʰ 17·2ᵐ, N 60° 2′ : 8·2, 8·7 : 52°·2 : 5″·7 : w.

1 (Σ 550). IVʰ 24·1ᵐ, N 53° 42′ : 5·1, 6·2 : 307°·1 : 10″·1 : w., blsh. w. Ysh., doubtful, perhaps green, sometimes tawny, '52. D., sapph. De., grn, or bl., pale rose, '54. Nearly halfway from α Pers. to δ Aur.; a little *n.* of line, in an ill-marked, but rich and beautiful district.

Σ 553. IVʰ 25·6ᵐ, N 50° 51′ : 8, 8·5 : 133°·3 : 3″·1 : w.

Σ 557. IVʰ 28·4ᵐ, N 62° 46′ : 8, 8·7 : 126°·1 : 23″·4 : w.

2 (Σ 566). IVʰ 32·0ᵐ, N 53° 17′ : 5·1, 7·4 : 311°·4 : 1″·6 : y., blsh. Ha., 277°·8, '90, Bin. c.p.m. *β comes* : 13·2 : 209°·8 : 23″·7. De., pair in field; 8·5, 9·5 : 264°·2 : 5″·7. Es., *comes* : 12·5 : 67°·7 : 18″.

3 (β 1043). IVʰ 32·0ᵐ, N 52° 53′ : 5, 12 : 297°·3 : 3″·9.

Σ 587. IVʰ 40·1ᵐ, N 52° 56′ : 7, 8·5 : 185° : 20″·9 : w., blsh.

5 (β 1187). IVʰ 46·9ᵐ, N 55° 6′ : 5·5, 12·8 : 245°·2 : 12″·9.

7 (Σ 610). IVʰ 49·3ᵐ, N 53° 35′ : 4·2, 11·3 : 238°·3 : 25″·6 : w., o. β easy 6-in. achr., '71; Wa., $4\frac{3}{10}$-in. achr., '73. De. added, '64, a *comes*, 7·9 : 308°·8 : 1″·2 (β 302°·1, '90) olive. He had never seen so sombre a star.

OΣ 89. IVʰ 52·0ᵐ, N 73° 56′ : 6·2, 7·6 : 305°·8 : 0″·6.

Σ 618. IVʰ 54·2ᵐ, N 62° 56′ : 7, 7·3 : 211°·5 : 32″·2 : w. ι is Σ 617 : 8·5, 8·7 : 120°·6 : 12″·4.

β (OΣΣ 57). IVʰ 54·5ᵐ, N 60° 18′ : De., 4, 7·2 : 208°·2 :

[CAMELOPARDUS]

80″·3 : y., w? Fr., lucid y., fine bl. Es., *comes* to 7·2 : 11·5 : 167°·5 : 14″·8.

11, 12 (Σ I 13). IV^h 57·4^m, N 58° 50′ : 5, 6 : 7°·1 : 181″·3 : blsh., vy., or red. Ysh. pale red. Fine field.

Σ 638. V^h 3·3^m, N 69° 42′ : 7·5, 8·5 : 222°·4 : 5″·3 : ysh., v. bl.

Σ 634. V^h 6·1^m, N 79° 8′ : 4·5, 7·9 : 348°·6 : 34″·0 ysh., w. Y., violet? '52. Ha., 8°·4 : 16″, '90.

Σ 677. V^h 15·4^m, N 63° 17′ : 7·7, 8 : 279°·4 : 1″·7 : v. w. Ha., 253°·6 : 1″, '90. Bin.

Σ 695. V^h 25·4^m, N 79° 17′ : 8·3, 9 : 155°·8 : 10″·3. *Comes* to 9; 9·7 : 172°·5 : 1″·9.

Σ 3115. V^h 38·9^m, N 62° 46′ : 6·7, 7·8 : 35°·6 : 1″·7 : w., áshy w. Maw, 24°·0, '89. Bin.

Σ 780. V^h 41·0^m, N 65° 44′ : 6·7, 7·9, 10·2 : 103°·6, 154°·9 : 3″·8, 10″·9 : y., bl., o.

Σ 784. V^h 53·7^m, N 84° 13′ : 8·7, 8·7 : 187°·7 : 1″·3 : yw.

35 (OΣ 128, rej.). V^h 56·6^m, N 51° 35′ : De., 6·3, 8·7 : 13°·1 : 39″·4 : w., azure. Yw., blsh., or purpsh, '52.

Σ 831. VI^h 0·4^m, N 67° 58′ : 8·7, 8·7 : 74°·1 : 11″·8 : o.

Σ 868. VI^h 11·4^m, N 73° 57′ : 8·5, 9 : 41°·8 : 3″·3 : w.

Σ 973. VI^h 50·8^m, N 75° 23′ : 6·6, 7·6 : 26°·7 : 11″·9 : w.

Σ 1006. VI^h 57·7^m, N 62° 42′ : 7, 8 : 71°·6 : 30″·6 : yw.

47 (Σ 1055). VII^h 13·5^m, N 60° 5′ : 6·0, 10·5 : 344°·1 : 2″·4.

Σ 1122. VII^h 36·4^m, N 65° 24′ : 7·1, 7·1 : 4°·9 : 15″·5 : w. Fr., decidedly ysh., '77.

Σ 1127. VII^h 37·8^m, N 64° 18′ : 6·2, 8, 9·2 : 340°·4, 174°·9 : 5″·2, 11″·3 : v. w., ashy, o.

OΣΣ 90. VII^h 53·6^m, N 63° 22′ : De., 6, 7 : 81°·8 : 47″·4 : v. w., y.

[CAMELOPARDUS]

Σ 1169. VIII^h 1·7^m, N 79° 48′ : 7·6, 7·9 : 10° : 20″·7 : yw., w.

Σ 1193. VIII^h 9·7^m, N 72° 43′ : 6, 9 : 85°·2 : 44″·4 : v. y., o.

Σ 1471. x^h 45·0^m, N 80° 19′ : 9, 9·1 : 3°·6 : 2″·1 : w.

Σ 1479. x^h 52·4^m, N 83° 46′ : 8, 9 : 21°·6 : 4″·6 : yw., ashy w.

Σ 1539. XI^h 23·2^m, N 81° 35′ : 8, 9·2 : 313°·1 : 19″ : yw., w.

OΣΣ 117. XII^h 6·5^m, N 82° 16′ : De., 6, 8 : 75°·6 : 65″·1 : gold, azure.

Σ 1625. XII^h 11·9^m, N 80° 41′ : 6·5, 7 : 218°·8 : 14″·3 : v. w.

Σ 1694. XII^h 48·3^m, N 83° 57′ : 4·9, 5·4 : 327°·2 : 21″·8 : v. w. Some diff., '52, $3\frac{7}{10}$-in. : pale y., pale viol.; not quite a match, '63, $5\frac{1}{2}$-in. Main, equal, '62. De., 4·5, 5·0, '66. Fr., pale y, lilac, '77; Sm., *comes*, II, *sp.*

Stars with Remarkable Spectra and Variables.

Es-Birm. 63. III^h 1·6^m, N 65° 21′ : 9·0 : R. : III? Es.

(Var.). III^h 33·2^m, N 62° 19′ : 6·7 (?) to 7·5 (?) R. : IV; At Harvard.

Es-Birm. 81. III^h 57·2^m, N 61° 31′ : 7·5 : R. : IV : Es.

T (var.). IV^h 30·4^m, N 65° 59′ : 7·9–8·2 below 12 : Per. 370^d. Es.

Es-Birm. 97. IV^h 40·8^m, N 70° 0′ : 7·0 : R. : Argel. IV. : Se.

S (var.). V^h 30·2^m, N 68° 45′ : 7·5, 12? Unknown : Es.

Es-Birm. 274. VIII^h 37·5^m, N 78° 32′ : 6·5 : yr : III : De.

R (var.). XIV^h 25·1^m, N 84° 17′ : 7·8–8·6 to 11·8–13·5 : Per. 269·5^d. Hencke.

[CAMELOPARDUS]

Nebulæ.

1501 (H. IV 53). III^h 58·4^m, N 60° 39′ : Plan. : small and dim. E. of Rosse sees it a bright ring, with star 14 m^s. in central darkness. Closely *f*, 1½° *n*, is H. VII 47, an elegant group with 7 m^s. pair, preceded by a wider one.

III^h 57^m, 69° 31′ : Neb. pretty bright and large. Denning.

2655 (H. I 288). VIII^h 42·5^m, N 78° 36′ : Nucleus like 11 m^s. star.

CANCER.

A constellation marked only to the naked eye by the remarkable cluster Præsepe.

Double Stars.

Σ 1170. VII^h 54·2^m, N 13° 59′ : 8·3, 8·3 : 95°·7 : 2″·2 : w.

Σ 1171. VII^h 55·1^m, N 23° 53′ : 6·2, 10·7 : 338°·6 : 2″·8 : y., o.

OΣ 186. VII^h 57·2^m, N 26° 34′ : 7·5, 8·2 : 74°·1 : o″·8 : w.

6. VII.^{h} 57·4^m, N 28° 5′ : 5, 13, 14, : est. 70°, 180° : 70″, 65″. B.

Σ 1179. VII^h 59·2^m, N 12° 22′ : 8·5, 8·5 : 205°·2 : 17″·9 : o. *β* 19″·9, *comes* : 11·5 : 57°·6 : 3″·9.

Σ 1177. VII^h 59·5^m, N 27° 49′ : 6·5, 7·4 : 354°·7 : 3″·5 : v. w., ashy w. D., pale grn., pale y. De., w., azure.

Σ 1188. VIII^h 3·2^m, N 30° 38′ : 8, 8·7 : 201°·3 : 15″·9 : v. w.

Σ 1191. VIII^h 5·0^m, N 19° 20′ : 8·7, 9·2 : 70°·9 : 3″·2 : w.

ζ. VIII^h 6·5^m, N 17° 57′ : 5·0, 5·7, 5·5 : 57°·6, 154°·7 : 1″·1, 5″·3 : y., '26. 15°·4, 144°·1 : 1″·2 ; 5″·2, '36. De., 162°·8, 133°·2 : in contact, 5″·5, '72. 100°·3, 130°·9 : 0″·7, 5″·4, '78 ; Ha., 35°·7, 122°·4 : 1″, 5″·5, '91. Bin., close pair, 59·11 yrs.,

[CANCER]

Seeliger, companion 600, 700 yrs. (Its irregularities have been explained by Seeliger as due to duplicity, the two components revolving in 17·6 yrs. β with the 36-in., however, cannot elongate it.) Excellent test, well separated, 8-in. 'With' spec. power 300, when at 0″·5; 1 disc apart, 9½-in. spec., '78, when at 0″·7; very easy, '85, when at 1″. Pointed at by α, β Gem. at double distance. De., m^m., 5·8, 6·9, 6·5.

Σ 1197. VIII^h 6·6^m, N 29° 51′ : 8·2, 9 : 102°·6 : 1″·6 : w.

Σ 1206. VIII^h 9·3^m, N 7° 29′ : 9, 9·5 : 199° : 13″·2 : o.

Σ 1219. VIII^h 17·7^m, N 7° 57′ : 8·5, 8·5 : 260° : 11″·6 : w.

ϕ^2 (Σ 1223). VIII^h 20·7^m, N 27° 16′ : 6, 6·5 : 212°·0 : 4″·6 : w. Much less unequal, '49; nearly equal, '59; so Talmage, '65; Fr., '77. Du. ± 0·1, '71, '74; still more striking if compared with υ^1; ½, ⅓ m^s. diff. 9½-in. spec., '72. De., 6·0, 6·3.

υ^1 (Σ 1224). VIII^h 20·7^m, N 24° 52′ : 6, 7·1 : 37°·3 : 5″·8 : w. Maw, 43°, '90. Considerably unequal, '49. Dc., 6·2, 7. C.p.m.

Σ 1228. VIII^h 21·6^m, N 27° 54′ : 8, 8·5 : 352° : 8″·9 : v. w. Not far from line from ϕ^1 to ϕ^2, nearer ϕ^1.

Σ 1231. VIII^h 23·6^m, N 31° 43 : 8·2, 8·7 : 210°·6 : 24″·8 : v. w.

Σ 1246. VIII^h 30·4^m, N 10° 15′ : 8·4, 9·4 : 114°·1 : 10″·3 : y., o. A pretty pair.

Σ 1254. VIII^h 34·6^m, N 20° 2′ : 6·5, 9 : 53°·9 : 20″·5 : v. y., o.

ι (Σ 1268). VIII^h 40·6^m, N 29° 7′ : 4·4, 6·5 : 307°·1 : 30″·5 : y., bl. Beautiful contrast. De., 4·2, 6·3. Σ 1266 in field *sp*; 8, 9·2 : 63°·5 : 23″·5 : w., o.

[CANCER]

Σ 1276. VIII^h 41·7^m, N 11° 32′ : 7·9, 8·1 : 354°·3 : 12″·5 : w.

Σ 1283. VIII^h 44·4, N 15° 13′ : 7, 8 : 123°·3 : 16″·5 : w.

Σ 1288. VIII^h 46·7^m, N 28° 50′ : 8·9, 9·0 : 259°·2 : 7″·4 : o.

σ^2 * (Σ 1291). VIII^h 48·2^m, N 30° 58′ : 5·9, 6·4 : 333°·3 : 1″·5 : y. Maw, 326°·7, '89. Good test: elongated $3\frac{7}{10}$-in. 80; divided 144. ι^2 of F., H., h., South, Σ, who finds diff. of m^g. var. De., 5·8, 6·2. Bird, "One of the loveliest pairs," both crocus y. with very minute *comes* (10·5 : ± 70″ *s.* Es.).

64. VIII^h 51·2^m, N 32° 50′ : 5·6, 8·9 : 294°·8 : 89″·7. South.

α (h. 110). VIII^h 53·0^m, N 12° 14′ : De., 4·5, 11·0 : 325°·5 : 11″·4. h. *comes* 20 m^g. Σ *subtilissima*. Sa. and h., w., red. A lovely object.

66 (Σ 1298). VIII^h 55·3, N 32° 39′ : 6·1, 8·2 : 137°·8 4″·6 : v. w., v. bl. Yw., bl., '51.

Σ 1300. VIII^h 55·8^m, N 15° 40′ : 8·7, 8·8 : 210° : 4″·1 y. Ha., 201°·9 : 5″, '85.

Σ 1301. VIII^h 56·0^m, N 26° 36′ : 8·5, 9 : 0°·2 : 10″·0.

Σ 1311. IX^h 1·7^m, N 23° 23′ : 6·7, 7·1 : 200°·5 : 7″·2 : w. De., 6·4, 7·1, '68. Du., 0·1 diff., '69, '72. Perr., 6·5, 6·8, '84.

Σ 1322. IX^h 7·1^m, N 16° 57′ : 7·7, 8·2 : 52° : 1″·7 : v. w. Bird, above 2 wide pairs.

Σ 1327. IX^h 9·6^m, N 28° 21′ : 8, 9·2 : 81°·4 : 16″·1 : o. Triple; 9 : 27°·9 : 25″·1.

* There is much confusion as to four different stars marked σ in this constell., arising probably, as Fr. has shown, from a mistake of A.'s as to the two streams of stars in which they occur. On this account F.'s Nos. 64, 66, have been substituted for σ^3 and σ^4 in the following list.

[CANCER]

Stars with Remarkable Spectra and Variables.

Es-Birm. 261. VIII^h 8·8^m, N 25° 2′ : 8·4 : R. : III. Es.

R (var.). VIII^h 11·0^m, N 12° 2′ : 6–8·3 below 11·7 : Per., 352·81^d. Schwerd.

V (var.). VIII^h 16·0^m, N 17° 36′ : 6·8–7·7 below 12 : Per., 271·9^d. Auwers.

U (var). VIII^h 30·0^m, N 19° 14′ : 8·4–10·6 below 14 : Per., 307·5^d. Charcornac.

S (var.). VIII^h 38·2^m, N 19° 24′ : Algol type, 8·2 to 9·8 : Per., 9^d 11^h 37^m 45^s. Hind., white.

Es-Birm. 279. VIII^h 47·7^m, N 19° 42′ : 8·2 : R. : D'A. var. Es.

Es-Birm. 281. VIII^h 49·7^m, N 17° 37′ : 6·5 : R. : Se. IV : D'A. var. Es.

T (var). VIII^h 51·0^m, N 20° 14′ : 8·0–8·5 to 9·3–10·5 : Per., 482^d. Hind. IV : Es.

Es-Birm. 289. IX^h 4·6^m, N 31° 22′ : 6·5 : R. : Hist. Cél. III : Se.

Clusters.

2632 (M. 44). VIII^h 34·3^m, N 20° 20′. The Præsepe of the ancients, just resolved by the naked eye; too large for usual fields, but full of fine combinations. Two triangles will be noted; Galileo counted 36 stars in it, with his newly-constructed telescope.

2682 (M. 67). VIII^h 45·8^m, N 12° 11′. Cl. (h. about 200 stars, 10–15 m^s.). Visible in finder.

CANES VENATICI.

The nebulæ here are fine. The only prominent star is Cor Caroli.

Double Stars.

Σ 1606. $12^h\ 5{\cdot}8^m$, N 40° 27′ : 6·3, 7 : 348°·6 : 1″·4 : w. Ha., 336°·9, '85.

Σ 1607. $12^h\ 6{\cdot}5^m$, N 36° 39′ : 7·8, 8·3 : 350°·3 : 33″·1 : w. Perr., 359°·3 : 30″·3, '86. Proper mot. h. *comes*. β 12·5 : 310°·1 : 20″·5.

Σ 1613. $12^h\ 7{\cdot}5^m$, N 36° 20′ : 8·5, 8·8 : 18°·5 : 1″·6 : w.

Σ 1615. $12^h\ 9{\cdot}1^m$, N 33° 21′ : 6, 8·2 : 88°·3 : 26″·9 : y., ashy.

2 (Σ 1622). $12^h\ 11{\cdot}1^m$, N 41° 13′ : 5·7, 8 : 259°·6 : 11″·4 : very gold, blue. Yw., rosy, '48. De., y., azure. Striking, though not conspicuous; ⅓ from Cor Caroli towards δ Leon.

Σ 1632. $12^h\ 15{\cdot}3^m$, N 38° 28′ : 6·5, 9·7 : 193°·4 : 10″·1 : y., o.

Σ 1642. $12^h\ 20{\cdot}9^m$, N 45° 18′ : 8, 8·8 : 183°·2 : 2″·8 : w. Bird, beautiful field.

Σ 1645. $12^h\ 23{\cdot}3^m$, N 45° 21′ : 7, 7·5 : 161°·5 : 10″·4 : yw. Bird, "A lovely pair as I ever saw."

Σ 1653. $12^h\ 28{\cdot}4^m$, N 32° 36′ : 8·3, 8·5 : 343°·2 : 7″·8 : w.

Σ 1679. $12^h\ 41{\cdot}4^m$, N 50° 22′ : 8·5, 9 : 208°·3 : 5″·5 : w.

12 (Σ 1692). $12^h\ 51{\cdot}4^m$, N 38° 52′ : 3·2, 5·7 : 227°·3 : 19″·9 : w. Cor Caroli. W. or ysh., tawny or lilac, '50, $3\frac{7}{10}$-in.; ditto, little contrast, $5\frac{1}{2}$-in., '62; pale y., fawn col., '65; pale y., pale copper, 9-in. spec., '70. h. saw no contrast, '30–1; De., w., pale olive blue, '56. K., v. pale y.,

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pale lilac, '65. Grover, creamy, fine bl., '67 : Fr., bright w., fawn col., '79. Relatively fixed for 73 yrs., yet considerable c.p.m.; unequal stars at nearly equal distances from us.

β 925. XII^h 52·1^m, N 44° 6′ : 6·5, 12·0 : 211°·3 : 7″·1.

OΣ 257. XII^h 52·2^m, N 46° 9′ : 7·5, 8·2 : 353°·6 : 13″·1.

Σ 1702. XII^h 53·9^m, N 38° 50′ : 8, 8·5 : 82°·7 : 35″·7 : yw., w.

Σ 1718. XIII^h 1·1^m, N 51° 31′ : 8·5, 9 : 272°·4 : 13″·1 : w.

β 930. XIII^h 1·4^m, N 45° 47′ : 6·2, 11·3 : 113°·3 : 2″·7.

15 (Σ I 24). XIII^h 5·5^m, N 39° 2′ : 5·5, 5·9 : 297°·5 : 290″ : yw.

OΣ 261. XIII^h 7·3^m, N 32° 36′ : 6·9, 7·4 : 353° : 1″·1 : ysh. Maw, 348°·8 : 1″·4, '91.

OΣ 263. XIII^h 12·4^m, N 51° 5′ : 7·7, 8·5 : 133° : 2″·3.

Σ 1755. XIII^h 27·9^m, N 37° 20′ : 7, 7·9 : 133°·8 : 4″·3 : yw., blsh. Bird, 7·9, grnsh. y.

Σ 1758. XIII^h 28·8^m, N 49° 39′ : 8, 8·2 : 311°·4 : 4″·2 : w. Bird, y.

25 (Σ 1768). XIII^h 33·0^m, N 36° 48′ : 5·7, 7·6 : 76° : 1″·1 : w., bl. Single to De., '31, Du., '69, Schi., 0″·4, '76, since then widening. β 137°·5 : 1″, '92. Bin. Per., 119·92 yrs. Do.

Σ 1776. XIII^h 37·6^m, N 46° 43′ : 8, 8 : 200°·2 : 7″·3 : w.

OΣΣ 125. XIII^h 42·7^m, N 39° 2′ : De., 5·2, 8·2 : 237°·4 : 71″·3 : wy., azure.

Σ 1789. XIII^h 49·6^m, N 33° 19′ : 8, 8·2 : 326° : 6″·1 : v. w.

Stars with Remarkable Spectra and Variables.

Es-Birm. 364. XII^h 40·4^m, N 45° 59′ : 5·5 : Hist. Cél. R. IV : Se. Var. Es.

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S (var.). XIII^h 8·6^m, N 37° 54′ : 7·3 to? Unknown, Es., '89.

Es-Birm. 378. XIII^h 18·8^m, N 47° 32′ : 7·0 : yr., Du. III : D'A.

R (var.). XIII^h 44·6^m, N 40° 2′ : 6·7–7 to 11·5 : Per. 340^d. Es., '88.

Es-Birm. 389. XIII^h 56·1^m, N 38° 22′ : 8·9 : yr. : III : var. : Du.

Nebulæ.

4111 (H. I 195). XII^h 2·0^m, N 43° 37′. Oval, with nucleus. D'A., resolved.

4414 (H. I 77). XII^h 21·5^m, N 31° 46′. Long; nucleus like star 11 m^g.

4449 (H. I 213). XII^h 23·3^m, N 44° 39′. Oval, resolved. D'A., unequally double. E. of Rosse, 3 nuclei.

4490 (H. I 198). XII^h 25·8^m, N 42° 12′. Long, easily resolvable. D'A., a small faint neb. *np*.

4631 (H. V 42). XII^h 37·3^m, N 33° 6. Very long ray (D'A., 13′). A small star *p*, and beyond it small faint neb.

4736 (M. 94). XII^h 46·2^m, N 41° 40′. Small bright neb., like a comet; h., a nucleus; E. of Rosse, spiral.

5005 (H. I 96). XIII^h 6·3^m, N 37° 36′. Long; nucleus, E. of Rosse, dark lanes?

5055 (M. 63). XIII^h 11·3^m, N 42° 33′. Oval, not bright. H. saw it 9′ or 10′ long, and near 4′ broad, with a very brilliant nucleus. An 8 m^g. star lies *p*, a minute triplet *f*. Huggins, spectrum continuous.

5194 (M. 51). XIII^h 25·7^m, N 47° 43′. E. of Rosse's wonderful spiral; its wreaths of stars are beyond all but the first telescopes; common ones will only show two very

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unequal neb. nearly in contact, both brightening in the centre: traces of the halo encompassing the larger may perhaps be caught; Sm. could not do more; "the enigma is another unequivocal mark of the illimitable power of the SUPREME CREATOR!" 9½-in. spec. showed plainly outer end of spiral, and junction with smaller neb. E. of Rosse, knots, well seen in Roberts's photo. Huggins, spectrum not gas. A misty spot in finder 3° *sp*, Alkaid, at end of Great Bear's tail.

5272 (M. 3). XIII^h 37·6^m, N 28° 53′. 'A brilliant and beautiful globular congregation of not less than 1000 small stars,' Sm., *blazing* splendidly, that is, running up into a confused brilliancy towards the centre, with many outliers. h., 11–15 m^s., making lines and irregular rays. 3$\frac{7}{10}$-in. hardly resolved it. Buffham centrally resolved, 9-in. 'With' mirror; sprinkled over, and surrounded by the larger stars, and resolved 9½-in. spec. In a triangle of stars, rather nearer Arcturus than Cor Caroli.

CANIS MAJOR.

α (Sirius). VI^h 40·7^m, S 16° 34′. This is the leader of the host of heaven: a glorious object, in all likelihood either far greater or more splendid than our Sun. It has been perceived at midday with ½-in. aperture. Hevel and Bond II. saw it with the naked eye in broad sunshine; and Plummer has seen a shadow cast by it. Its colour has probably changed. Seneca called it redder than Mars; Ptolemy classed it with the ruddy Antares. Lynn, however, doubts the construction put on the evidence. I now see it of an intense white, with a sapphire tinge, and an

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occasional, probably, atmospheric flash of red. Hind and Pogson have found similar decided changes of colour in variable stars. In the spectrum of Sirius, and many white stars, the lines of hydrogen are abnormally strong, all those of the metals remarkably faint. The very minute parallax of Sirius indicates, according to Hind, nearly seventeen years of light passage—an inconceivable distance, far surpassing, probably, that of many telescopic stars. From irregularities in the proper motion of Sirius and Procyon, Bessel fully believed that each was a member of a binary system, their companions being dark and invisible. This remarkable idea has been, to some extent, justified by A. Clark's discovery in 1862 of a 10 m^{s}. star, nearly at the required distance and angle, a most interesting object which, in 1862, according to Bond, was at 84°·5 : 10″·1 ; β found 52°·4 : 10″·8, '78. After this it rapidly closed up. β 359°·7 : 4″·1, spring of 1890, and in the autumn it was lost even in the Lick 36-in. β thinks Period not more than fifty-three years, Gore gives 58·47 years. OΣ thinks its mass must be at least half that of Sirius, but its nature very different, or it would shine as 1 m^{s}. star. D. asks, 'Is it an enormously large globe endued with very small light-producing power? or perhaps shining by reflection from Sirius." Auwers, who finds by two independent methods a period of 49·399 years, assumes the ratio of the mass of Sirius to that of its companions is 2·05 to 1. Five other *comites* were seen by Goldschmidt (?). Spectroscopic observations have led Huggins to the conclusion that Sirius was, in '68, receding from us with a velocity of 18 to 22 miles per second. Vogel raises this to 46 miles.

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Double Stars.

ν^1 (H. IV 81). VI^h 32°·0^m, S 18° 35′ : Cin., 5·7, 8·0 : 262°·9 : 17″·5. Y., pale violet, '51. 3° *sp a.*

β 19. VI^h 37·5^m, S 15° 54′ : De., 6·7, 9·0 : 165°·0 : 3″·5.

Σ 970. VI^h 43·0^m, S 11° 37′ : 8·5, 9 : 128°·6 : 20″·1 : o.

Σ 971. VI^h 43·8^m, S 13° 19′ : 8·2, 8·5 : 331° : 1″·9 : o '29. Muller, 324°·5 : 1″·8, '86.

A C. 4. VI^h 44·4^m, S 15° 2′ : De. : 6·0, 8·7 : 286°·4 : 1″·1.

Σ 990. VI^h 49·8^m, S 14° 7′ : 8·7, 9·3 : 274°·9 : 3″·3 : w.

μ (Σ 997). VI^h 51·5^m, S 13° 55′ : 4·7, 8·0 : 343°·5 : 3″·2 : y., bl. Ha., 339°·8 : 2″·9, '87.

ϵ. VI^h 54·7^m, S 28° 50′ : 2, 9. Maclear : 160°·6 : 7″·5.

Σ 1011. VI^h 56·3^m, S 15° 10′ : 8, 8·5 : 295°·7 : 4″·5.

β 328. VII^h 2·0^m, S 11° 8′ : De., 6·2, 8·0 : 128°·4 : 0″·3 : '75. β 118°·0 : 0″·5; *comes*, 10·4 : 348°·0 : 17″·4, '92.

Σ 1031. VII^h 4·0^m, S 13° 49′ : 8·3, 9 : 251°·6 : 3″·8 : o. h., *comes*; β 12 : 349°·7 : 12″.

h. 3945. VII^h 12·4^m, S 23° 8′ : 7, 8 : 67°·6 : 28″·2 : orange, blue. 6·5, 8 : fiery red, grnsh. bl. Es., large star var? Magnificent pair.

Σ 1069. VII^h 13·4^m, S 13° 30′ : 8·3, 8·3 : 193°·3 : 25″·4 : w.

30 (h. 3948). VII^h 14·5^m, S 24° 47′ : β 6·0, 10·5, 11·5 : 90°·0, 80°·3 : 7″·8, 14″·3; with 8·7, 78°·0 : 84″·4. In rich cl. H. VII 17.

Stars with Remarkable Spectra and Variables.

Es-Birm. 188. VI^h 19·7^m, S 27° 1′ : h., intense R.

Star. VI^h 50·0^m, S 23° 48′ : 6·5 : Type V. Pickering.

Es-Birm. 210. VI^h 54·1^m, S 17° 1′ : 8·6 : Webb : pale ruby.

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Es-Birm. 218. VII^h 3·4^m, S 11° 46′ : 7·6 : Hist Cél. Red. IV : Se.

R (var.). VII^h 14·9^m, S 16° 12′ : 5·9 to 6·7 : in 1^d 3^h 15^m 46^s. Algol type. Sawyer.

Es-Birm. 229. VII^h 18·9^m, S 25° 34′. h., red

Clusters.

2287 (M. 41). VI^h 42·7^m, S 20° 38′. Superb group, visible to naked eye, '51, 4° beneath *a*. Larger stars in curves, with ruddy star (Es. var?) near centre, 5½-in. h. says the latter frequently occurs in cls. See note on Sagittarius, *infra*.

2360 (H. VII 12). VII^h 13·2^m, S 15° 27′. Beautiful cl. h., 10 m^s. melting into a very rich neighbourhood, as though the Galaxy were approaching us. 64 includes a bright w. star *p*. Sm. notes that the stars are nearly all 10 m^s. 3° *f* *γ*.

CANIS MINOR.

a (Procyon). VII^h 34·1^m, N 5° 30′. A fine pale y. star (which see under Sirius) with a light passage of more than 26 y., has several minute attendants in a large field. One, 23 sec. *f*, was found double by Bird, with 12-in. spec. '64, 9·5, 9·8 ; seen by Buffham with 9-in. 'With,' and detected independently with 6-in. achr. by *β* as well as by De., 182°·6 : 0″·8, '72 (Ha., 193°·5 : 0″·7, '91. Bin.). Severe test. Lamont minute *comes np* : D. just sees it steadily with 8¼-in achr., and gives it 11·8 m^s. (Σ). *β* 335°·2 : 35″·9 : '81. 44 sec. *f* Procyon 3′ *s* is Σ 1126 : 7·2, 7·5 : 132°·0 : 1″·5 : ysh. Discs in contact, 144 ; occasionally just split, 250 ; divided by disc of 7, 9½-in. spec., 460 (Ha., 142°·2 : 1″·2, '91. Bin.). Amici discovered *comes* ; Sa., with 2½-in., est. 13 : 240° : 25″.

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About 1° *s f* is a fine or. 7 or 8 m^g. star. Wa., pretty pair, 35′ *n* of Procyon and 2 *comites* to star 10 m^g. *p a*. Vicinity very rich in small pairs and triplets.

Double Stars.

O Σ 170. VII^h 12·1^m, N 9° 29′ : 7·5, 7·5 : 120°·6 : 1″·2 : y. Maw, 110°·9 : 1″·6, '91.

Σ 1067. VII^h 13·6^m, N 3° 4′ : 7·7, 8·7 : 265°·5 : 25″·6 : w.

Σ 1076. VII^h 15·8^m, N 4° 15′ : 8·7, 8·7 : 106°·7 : 2″·7 : w.

Σ 1082. VII^h 18·3^m, N 10° 54′ : 8, 8·7 : 326°·5 : 19″·9 : w. *β comes* : 13 m^g.

Σ 1095. VII^h 21·9^m, N 8° 57′ : 8·3, 8·8 : 78° : 9″·8 : v. w.

η (*β* 21). VII^h 22·6^m, N 7° 9′ : 5·7, 11·2 : 25°·8 : 4″.

Σ 1099. VII^h 23·9^m, N 11° 44′ : 8·4, 9 : 343°·4 : 4″ : v. w.

Σ 1103. VII^h 25·2^m, N 5° 28′ : 7, 8·5 : 244°·5 : 4″·3 : v. w., ash.

Σ 1114. VII^h 28·2^m, N 9° 31′ : 8·5, 9 : 53°·6 : 6″·5 : w. Pretty group.

Σ 1116. VII^h 29·0^m, N 12° 32′ : 7, 7·7 : 111° : 1″·8 : w.

Σ 1130. VII^h 36·2^m, N 9° 57′ : 8·4, 8·9 : 162° : 2″ : o.

Σ 1137. VII^h 41·3^m, N 4° 22′ : 8, 9 : 132°·7 : 2″·8 : ysh., bl.

Σ 1149. VII^h 44·3^m, N 3° 28′ : 7·3, 9 : 40°·3 : 22″ : yw., ysh., blsh. Pretty.

14 (*Hh.* 284). VII^h 53·2^m, N 2° 30′ : Sm. : 6, 8, 9 : 64°·9, 153°·4 : 75″, 115″, pale w., '31, blsh., bl. 6 deep y., '51. 8 very little brighter than 9 : so Sa., '76 ; Fr., full y., 8, 9 equal, '77.

Σ 1181. VIII^h 0·0^m, N 8° 30′ : 8, 9·5 : 140°·3 : 5″·2 : ysh., blsh.

Σ 1182. VIII^h 0·1^m, N 6° 7′ : 7, 9 : 72°·6 : 4″·4 : w., o.

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Stars with Remarkable Spectra and Variables.

R (var.). VII^{h} 3·2^{m}, N 10° 11′ : 7·2–7·9 to 9·5–10 : Per., 336·5^{d}. At Bonn.

S (var.). VII^{h} 27·3^{m}, N 8° 32′ : 7·2–8 to 10·5–12·7 : Per., 330·3^{d}. Hind.

T (var.). VII^{h} 28·4^{m}, N 11° 58′ : 9·0–9·7 below 13·5 : Per., 322.7^{d}. Schönfeld.

Es-Birm. 240. VII^{h} 31·3^{m}, N 2° 18′ : 9·3 : R. : IV : Es.

Es-Birm. 241. VII^{h} 32·0^{m}, N 5° 38′ : 8·0 : pale ruby : Webb. III. : Es.

U (var.). VII^{h} 35·9^{m}, N 8° 37′ : 8·5–9·0 to 12·3–13·5 : Per., 410^{d}. Baxendell. IV.

Es-Birm. 249. VII^{h} 38·1^{m}, N 5° 11′ : 7·1 : R. : Banded spect. : D'A.

CAPRICORNUS.

Not a conspicuous constellation, but containing some good objects, among which its principle star takes a high rank.

Double Stars.

α (Σ I 51). XX^{h} 12·1^{m}, S 12° 50° : 3·2, 4·2. De., 291°·2 : 376″·1, y. A noble pair obvious to naked eye. α^{2} has *comes* (De., 151°·4 : 8″·3 : m^{g}. 11·5) just seen once by Sm. obvious to Sa. 6½-in. spec. and β 6-in. achr. Buffham sees it with 9-in. spec., and Ward with 4$\frac{3}{10}$-in. achr. Alvan G. Clark has doubled it (β 239°·0 : 1″·2).

σ (*Hh.* 682). XX^{h} 13·6^{m}, S 19° 26′ : β 5, 8·3 : 177°·2 : 55″·8, widening, orange, blue, '50; y, ruddy, *comes* 10 m^{g}. 9-in. spec., '70.

β (Σ I 52). XX^{h} 15·4^{m}, S 15° 5′ : 2·5, 6. De., 267°·1 :

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205″·3 : y., bl., '50. Very minute pair between them (β 322°·3 : 6″·4 : 13, 13·4). Very fine large field. Barnard doubles β^1 : β 108°·0 : 0″·9 : 6, 10·3.

Σ 2678. xx^h 20·4^m, S 8° 38′ : 9, 9·2 : 320°·7 : 3″·5 : o.

π (β 60). xx^h 21·6^m, S 18° 32′. De., 5·1, 8·7 : 145°·2 : 3″·3. Discovered by Mitchel.

Σ 2683. xx^h 22·8^m, S 13° 30′ : 8, 8·5 : 67°·1 : 22″·8 : w.

ρ (H*h*. 688). xx^h 23·1^m, S 18° 9′. De., 5·0, 7·1 : 174°·1 : 2″·8 : w., ash. Pale y., ruddy purp., '50, a 7·5 *f s* viol. or lilac, a fine addition. β excessively difficult *comes* between ρ and 7·5. Sa., easy 6½-in. spec.

o^2 (H*h* 689). xx^h 24·1^m, S 18° 55′. Wilson, 6·3, 6·8 : 239°·9 : 21″·8 : w., blsh., '50.

β 668. xx^h 27·0^m, S 10° 12′ : 6·2, 11·7 : 29°·0 : 4″·6.

Σ 2699. xx^h 31·4^m, S 13° 5′ : 8, 9 : 192°·2 : 9″·6 : w. h., two *comites*.

h. 1567. xx^h 39·8^m, S 15° 23° : 8½, 11 : est. 345° : 25 : w., Pretty pair 8, 9 : lilac, perhaps blsh. grn.

Σ 2826. xx^h 42·0^m, S 13° 35′ : 8, 8·5 : 82°·5 : 4″·3. How[illegible] doubles 8 : 285° : 0″·8.

Stars with Remarkable Spectra and Variables.

R (var.). xx^h 5·7^m, S 14° 34′ : 8·8–9·7, below 13 : P[illegible] 345^d. Hind.

W (var.). xx^h 8·6^m, S 22° 17′ : 10·2–10·5, below 1[illegible] Per., 209^d? Peters.

Es-Birm. 659. xx^h 11·3^m, S 21° 37′ : 7·7 : R. : Hist. IV : Se. Var : Se. and Gore.

Es-Birm. 671. xx^h 21·8^m, S 28° 35′ : 7¾ : R. : Com. Temps.

U (var.). xx^h 42·6^m, S 15° 9′ : 10·2–10·8, below 13 [illegible] 202·5^d. Pogson.

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Es-Birm. 699. XXI^{h} $1{\cdot}7^{m}$, S 16° 49′ : 8·2 : R. Holden.

V (var.). XXI^{h} $1{\cdot}8^{m}$, S 24° 19′ : 9 to 14? : Per., $157{\cdot}1^{d}$. Peters.

X (var.). XXI^{h} $2{\cdot}8^{m}$, S 21° 45′ : 9·5–10, below 16·2 : Per., $218{\cdot}1^{d}$. Peters.

T (var.). XXI^{h} $16{\cdot}5^{m}$, S 15° 35′ : 8·8–9·7 to 13·5 : Per., $269{\cdot}2^{d}$. Hind.

Cluster

7099 (M. 30). XXI^{h} $34{\cdot}7^{m}$, S 23° 38′. Moderately bright; beautifully contrasted with an 8 m^{s}. star beside it; comet-like with 64; with higher powers resolvable (into 12 m^{sm}. h.). 'What an immensity of space is indicated! Can such an arrangement be intended, as a bungling spouter of the hour insists, for a mere appendage to the speck of a world on which we dwell, to soften the darkness of its petty midnight? This is impeaching the intelligence of Infinite Wisdom and Power, in adapting such grand means to so disproportionate an end. No imagination can fill up the picture, of which the visual organs afford the dim outline; and he who confidently probes the Eternal Designs cannot be many removes from lunacy' (Sm.). E. of Rosse, spiral arrangement of branches. It lies closely p a little n from 41, a 5 m^{s}. star.

CASSIOPEA.

Here lie a multitude of superb Galaxy fields. The leader α is a slightly var. 2 m^{s}. to 2·5 in $79{\cdot}1^{d}$. Birt gives $50{\cdot}98^{d}$, but Schm. perceives no change. Snow always found it sharper and smaller, and more readily obscured by fog than β or γ, even when equally bright.*

* A difference in the aspect of different stars, independent of

[CASSIOPEA]

Double Stars.

β. $0^h\ 3{\cdot}8^m$, N 58° 36′: 2 m^s., with minute *comes* found by A. G. Clarke (*β* 189°·2 : 22″·6 : 13·7 m^s.) is a pointer to two pretty pairs a short distance *sp*. The *p* one is Σ 3057 : 7·2, 9·3 : 299°·6 : 3″·6 : ysh., ashy. The closer and more interesting one is Σ 3062. 6·8, 7·9 : 36°·7 : 1″·3, '23. K., 269°·9: 1″·4, '65. Ha., 325°·2 : 1″·3, '90. Bin. Per., 112·64 yrs., Schur. Distance at closest, 0″·5; at widest, 1″·5, Ha. Nearer *β* is a curious 8 m^s. triangle suggesting (as so many others) actual, not optical vicinity. *β* one an excessively close pair (*β* 253: 8·3, 8·4: 47°·2: 0″·6; *comes* 8·8: 346°·3: 39″·7). Fine region a little *f*.

Σ 16. $0^h\ 11{\cdot}4^m$, N 54° 6′: 7·7, 9: 38°·2: 5″·5: v. w. (Bird in a vertical curve).

β 392. $0^h\ 11{\cdot}6^m$, N 60° 59′: 6, 12·5: 67°·8: 19″·3.

Σ 30. $0^h\ 21{\cdot}8^m$, N 49° 26′: 6·8, 8·7, 295°·9: 21″·2: w., ash, '31. *β* 299°·7: 19″, '80. Rect. mot.

β 1094. $0^h\ 24{\cdot}8^m$, N 59° 25′: 5·7, 9·5: 244°·6: 0″·7.

magnitude, and sometimes of colour, has been noticed by several observers. Sm., speaking of a dull 11 m^s. star seen best by averted vision, remarks that "there are many of much smaller magnitudes which shine quite sharply, and emit a strong blue ray." Key says, 'We constantly meet with stars which loom large with a faint light, and others again very vivid, but contracted apparently to a point.' Babinet remarks that some stars have a peculiar power of overcoming twilight. A. gives ζ Aurigæ as a striking instance among others of singularly intense light for its magnitude. He says that red and yellow stars appear brighter in proportion to the superiority of the eye and instrument. Schm. finds that red stars gain in twilight, lose by night, as compared with wh. ones, and that the position of the eyes is of material consequence in such estimates. Es. notes that red stars gain nearly 0·5 m^s. in moonlight. Pickering finds that in the case of two equal stars the lower always *appears* the brighter.

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λ (OΣ 12). $0^h\ 26{\cdot}2^m$, N 53° 59′: 5·6, 5·9: 304°·1: 0″·5, ’44. 146°·4, ’88, Ha. Bin.

a (*Hh.* 11). $0^h\ 34{\cdot}8^m$, N 56° 0′. *β* 2, 9: 280°·2: 63″·2. (Two *comites*: 14, 14·5: 106°·5, 272°·4: 39″·7, 17″·6.) Fine y., blsh., ’50. 12^m *f* 6′ *n* is a pretty quintuple. *β* 1: 8·2, 9·8, 8·7, 8·7, 12·5: 82°·6, 134°·2, 193°·7, 333°·1: 1″·4, 3″·8, 9″, 15″·8. Es. pair 9^m *p a* 14′ *n*: 8·1, 8·5: 113°·3: 6″·4; another, 5^m *p*, 3′ *n*: 8, 9: 158°·5: 8″·7: pale or., pale blue.

β 492. $0^h\ 39{\cdot}6^m$ N 54° 40′: 5·7, 11·3: 152°·7: 2″·1.

Σ 59. $0^h\ 42{\cdot}3^m$, N 50° 54′: 7·2, 8·1: 145°: 2″·2: v. w. Fl., bin. and c.p.m.

η (Σ 60). $0^h\ 43{\cdot}0^m$, N 57° 17′: 4, 7·6: 88°·6: 9″·7: y., purp. Es., 193°·9: 5″, ’92. Y., pale garnet, ’49; ’50. Herschel and South, red, grn. De., y., and generally red. Es., *comes* pale red, ’92. Bin. Per., 222·43 yrs., Doberck. Great c.p.m. Light passage, 21 yrs. Es., pair $6\frac{1}{2}^m$ *f*: 9·6, 9·8: 112°·3: 4″·9.

Σ 65. $0^h\ 46{\cdot}4^m$, N 68° 19′: 8, 8: 35°·1: 3″: v. w.

β 497. $0^h\ 47{\cdot}1^m$, N 60° 34′: 6: distant *comes* double; 9, 11·5: 150°·9: 0″·9.

υ^1 (*β* 1098). $0^h\ 49{\cdot}0^m$, N 58° 26′: 6, 13·5: 75°·2: 12″·8.

γ (*β* 1028). $0^h\ 50{\cdot}7^m$, N 60° 10′: 2, 11: 255°·9: 2″·2. Se. and Huggins find double spect. like that of T Cor. *F* bright, and many other lines. Beautifully contrasted with minute surrounding stars. 21′ *s* is *β* 1099: 6·1, 6·8, 270°·2: 0″·1, ’89; 282°·2, ’91. Bin. Closely *f* which Ingall has pointed out a pretty little pair; red, bl., ’65. Es., 203°·2: 21″·2. Orange, blsh.

β 396. $0^h\ 57{\cdot}4^m$, N 60° 32′: 6, 10: 66°·4: 1″·3.

OΣ 23. $1^h\ 4{\cdot}2^m$, N 51° 14′: 7·5, 8: 193°: 14″·6: ysh.

Σ 96. $1^h\ 6{\cdot}1^m$, N 64° 29′: 7·8, 8·8; 280°·9: 1″·3: w.

Σ 97. $1^h\ 6{\cdot}3^m$, N 51° 0′: 8·5, 8·7: 98°·6: 4″·5: v. w.

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β 258. 1h 6·8m, N 61° 10′ : 6·3, 9·7 : 268°·2 : 1″.

35 (OΣΣ 15). 1h 14·3m, N 64° 8′ : Es., 6·5, 8·5 : 349°·7 : 52″·2 : w., or.

ψ (Σ 117). 1h 18·8m, N 67° 36′ : 4·4, 8·9 : 101°·8 : 32″·2 : v. y., o. ; '31. β 107°·4 : 28″, '89. 8·9 is double; *comes* 9·5 : 253°·3 : 3″, '31, and β finds 13·5 *comes* to 4·4 : 41°·2 : 3″·2, '89. 4·4, or.; 8·9, bl., '50. $5\frac{1}{2}$ in. showed 8·9 double.

Σ 131. 1h 26·6m, N 60° 11′ : 6, 9·2 : 142°·4 : 13″·6 : ysh., o.

Σ 130. 1h 27·3m, N 69° 23′ : 8, 9 : 187°·7 : 7″·5 : ysh., ash.

OΣ 33. 1h 30·0m, N 58° 9′ : 7·2, 8·3 : 74°·4 : 24″·3 : ysh., o.

44 (β 1103) 1h 36·6m, N 60° 3′ : 6·2, 12·5 : 3°·8 : 1″·7.

Σ 148. 1h 39·0m, N 63° 19′ : 8·4, 9 : 130°·4 : 1″·4 : w.

Σ 163. 1h 44·0m, N 64° 21′ : 6·2, 8·2 : 33°·6 : 35″ : red gold, blue; remarkable colours. M^{gs}. high? Cols. splendid. De., 6, 8·2. Es., 7, 8·5.

Σ 182. 1h 49·3m, N 60° 48′ : 7, 7 : 302° : 3″·6 : yw. Es., *comes* 13·5 : 75°·2 : 29″·9.

48 (β 513). 1h 53·8m, N 70° 25′; 5, 7·5 : 264°·4 :1″, '78. 313°·5 : 0″·6, '91. Bin. *Comes*: 13·6 : 51°·2 : 23″·7.

Σ 191. 1h 54·2m, N 73° 21′ : 6·2, 8·5 : 190°·7 : 5″·6.

49 (β 785). 1h 55·9m, N 75° 38′ : 6, 13 : 245°·7 : 5″·2.

OΣΣ 26. 1h 12·4m, N 59° 35′: De., 6·1, 6·6 : 199°·6 : 63″·5. Es., pale orange, pale grn. 3rd star makes a triangle.

ι (Σ 262). 1h 20·8m, N 66° 57′ : 4·2, 7·1, 8·1 : 276°·7, 107°·3 : 1″·9 7″·6 : y., bl., bl. Ha., 256°·6; 112°·5 : 2″·2 : 7″·4, '89. Y., lilac, bl., a fine but not easy object, $3\frac{7}{10}$, '50.

Σ 282. 1h 32·7m, N 65° 13′ : 8·3, 8·3 : 294° : 7″ : w.

Σ 283. 1h 32·8m, N 61° 4′ : 8, 8·8 : 209°·2 : 1″·8 : y., ashy.

Σ 306. 1h 43·4m, N 60° 1′ : 7·1, 9 : 93°·4 : 2″·1. De., *comes* 11·5 : 156°·9 : 27″·5. Es., three others, 13·8, 13·5, 13·0 :

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74°·3, 112°, 105°·6 : 17″, 19″·2, 27″·4. Three more distant. De., triplet *sf* : 8, 11, 11·5 : 21°·5, 11°·3 : 10″·7, 20″·3.

Σ 335. 11^h $56·3^m$, N 63° 22′ : 8, 8·5 : 158°·5 : 24″·4.

OΣ 50. 111^h $2·7^m$, N 71° 11′ : 7·5, 7·5 : 216°·1 : 1″·1 : w.

OΣ 496. $XXIII^h$ $25·4^m$, N 58° 0′. A, 5·4, B, 7·4, C, 10·0, D, 8·9 : AB, 269°·2 : 76″·1 : AC, 337°·2 : 1″·5 : BD, 221°·9 : 1″·5. Wh., pale r., o., r. : (*β* AC 342°·1 ; BD, 224°·1, '89). A, yw. : B, pale lilac, '54. D. doubled B ; Perry, easy 6½ in. Calver spec., '80. h. found a *comes* to B (*β* 11·6 : 337°·1 : 26″·9) two more distant, one of which is double. De., 9·2, 9·6 : 73°·5 : 10″·3. *β* finds a star 231″·1 distant in 207°·6 a close double : 9·4, 9·8 : 309°·1 : 0″·5.

Σ 3037. $XXIII^h$ $41·3^m$, N 59° 55′ : 7, 8·5, 8·9 : 214°, 184°·4 : 2″·7, 28″·9 : v. y., bl., o. Es., curious similarity in *comites*, and another, 8·8 : 228°·2 : 50″·3.

Σ 3038. $XXIII^h$ $41·3^m$, N 62° 6′ : 9, 9·5 : 275° : 4″·4 : w.

6 (OΣ 508) $XXIII^h$ $44·0^m$, N 61° 40′ : 5·7, 8·2 : 196°·2 : 1″·7 : v. y., o.

Σ 3047. $XXIII^h$ $52·8^m$, N 56° 50′ : 8·7, 8·7 : 65°·6 : 1″·2 : yw., '32. *β* 73°·1 : 0″·9. *Comes* : 12 : 189°·8 : 7″·9. Bin.

σ (Σ 3049). $XXIII^h$ $53·9^m$, N 55° 12′ : 5·4, 7·5 : 323°·5 : 3″ : grn, v. bl. Wh., tawny, '50. Glorious low-powered field.

Σ 3053. $XXIII^h$ $57·4^m$, N 65° 32′ : 6, 7·3 : 70° : 15″·2 : v. y., bl.

Stars with Remarkable Spectra and Variables.

Es-Birm. 1. 0^h $4·2^m$, N 63° 24′ : 8·7 : R : h. III : var? Es.

T (var.). 0^h $17·8^m$, N 55° 14′ : 7–8 to 11–11·2 : Per., 445^d. Krueger.

U (var.). 0^h $40·8^m$, N 47° 43′ : 8–8·8 below 15 : Per., 267^d Es., '87. In low-powered field with o, *f*.

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Es-Birm. 13. $0^h\ 49{\cdot}0^m$, N 58° 1′ : 9·5 : R. : IV? Var., 8·4 to 9·5? Es.

Es-Birm. 14. $0^h\ 51{\cdot}7^m$, N 67° 9′ : 8·8 : orange r. : h. III? Es.

S (var.). $1^h\ 12{\cdot}3^m$, N 72° 5′ : 6·7–8·6 below 13·5 : Per., $610{\cdot}5^d$. A. *F* very bright at max. Es.

Es-Birm. 32. $1^h\ 48{\cdot}5^m$, N 69° 43′ : 8·0 : R. : A. III : Es.

Es-Birm. 34. $1^h\ 51{\cdot}6^m$, N 58° 47′ : 8·6 : R : Holden. III or IV. Du.

Es-Birm. 36. $1^h\ 52{\cdot}9^m$, N 54° 20′ : 9 : R. : Bands : Pickering.

Es-Birm. 39. $1^h\ 56{\cdot}4^m$, N 54° 35′ : 7·9 : R. : h. III. Es.

Es-Birm. 54a. $II^h\ 33{\cdot}8^m$, N 59° 17′ : 8·2 : R. : III? Es.

Es-Birm. 63. $III^h\ 1{\cdot}5^m$, N 65° 21′ : 9 : R. : III? Es.

Es-Birm. 746. $XXIII^h\ 19{\cdot}4^m$, N 58° 38′ : 9 : R. : IV? Es.

R (var.). $XXIII^h\ 53{\cdot}3^m$, N 50° 50′ : 4·8–7 to 9·7–12. Per., 429^d. Pogson.

Es-Birm. 762. $XXIII^h\ 53{\cdot}9^m$, N 62° 20′ : ? : R. : Pickering.

Es-Birm. 764 (OΣΣ 254). $XXIII^h\ 56{\cdot}2^m$, N 59° 48′ (De., 6·3, 7·7 : 269°·6 : 58″·9). R. A *comes* blue. III or IV? Du. Several tiny pairs in field *n*, and pair 8·6, 9·2 : 289°·5 : 10″·1 : y., bl. : 32′ *s*, another *p*. Es

Temporary Star.

According to A., it was at $0^h\ 19{\cdot}2^m$, N 63° 35′ that the Great New Star flamed out, Nov., 1572, speedily rivalling Venus, so as to be seen at noonday, then fading during sixteen months to utter extinction: there is some idea that similar appearances took place here in 945 and 1264; if so, we may possibly witness a repetition of this incomprehensible phænomenon. D'A. found a minute star,

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10–11 m^{s}. near its place, '65, where A. could formerly see none. So Es., '78, '80, '89, who has examined this and neighbouring stars without finding anything remarkable in their spectra. Safarik finds it var. The colour of the great star changed from w., through y. and r., to bl. Hind thinks that several var. stars increase bl., are y. after max., and flash red in decreasing.

Clusters and Groups.

κ. 0^{h} 27·3^{m}, N 62° 23′ : 4 : w., '50. A little ysh., '55; stands in a grand region. One group resembles a capital Y.

225 (H. VIII 78). 0^{h} 37·6^{m}, N 61° 14′. Fine cl., somewhat like the letter W; half way from *γ* to *κ*.

457 (H. VII 42). 1^{h} 12·8^{m}, N 57° 48′ : is a very elegant group attending *φ*, 5 m^{s}. The second star lilac. Red star 30′ *n*, a little *f φ*.

581 (M. 103). 1^{h} 26·6^{m}, N 60° 11′. Beautiful field. 1° *f* a little *n* of δ, containing Σ 131 *supra*, and red star (Es-Birm. 28).

663 (H. VI 31). 1^{h} 39·2^{m}, N 60° 44′. Visible in finder; field very good, 64; 80 showed Sm's. little pair, Σ 153 : 8·5, 9·7 : 69·2° 7″·5, but not his ruby, 8 m^{s}., '33. 2½° from δ, on line from *α*.

7789 (H. VI 30). XXIII^{h} 52·0^{m}, N 56° 9′. Beautiful large faint cloud of minute stars; h., 11–18. 'A most superb cl.' 'A mere condensed patch,' as Sm. remarks, 'in a vast region of inexpressible splendour, spreading over many fields;' including the whole Galaxy through this and the adjacent constellations.' [A beautiful group in a rich field lies about ¾° *f* δ. Glorious region between *π* and *o*.]

CEPHEUS.

Much more barren to the naked eye than to the telescope. Splendid sweeps and curious groups between α and Galaxy.

Double Stars.

Σ 2. $0^h\ 3{\cdot}8^m$, N 79° 10′ : 6·3, 6·6 : 341°·5 : 0″·8 : y., '30. Ha., 3°·6 : 0″·3, '88. Bin.

Σ 13. $0^h\ 10{\cdot}5^m$, N 76° 23′ : 6·6, 7·1 : 124° : 0″·5 : yw., '31. β 91°·7 : 0″·8, '89. Bin.

Σ 34. $0^h\ 26{\cdot}2^m$, N 77° 33′ : 8·7, 8·8 : 334° : 5″·8 : o. Bird, minute *comes* to a star *f*.

Σ 48. $0^h\ 36{\cdot}4^m$, N 70° 49′ : 7, 7·2 : 333° : 5″·5.

Σ 170. $1^h\ 46{\cdot}1^m$, N 75° 44′ : 6·7, 7·5 : 246°·8 : 3″·2 : yw., blw.

Σ 185. $1^h\ 52{\cdot}8^m$, N 75° 0′ : 7, 8·5 : 40°·3 : 1″·4 : w. Bird, not divided, '72. β 29°·9 : 1″·3, '81. Bin.

Σ 199. $1^h\ 57{\cdot}5^m$, N 67° 13′ : 8·5, 8·5 : 21° : 35″·8 : w.

Σ 233. $11^h\ 11{\cdot}4^m$, N 75° 55′ : 8·5, 9 : 278°·4 : 2″·6 : w.

Σ 320. $11^h\ 52{\cdot}8^m$, N 79° 1′ : 6·3, 9·5 : 227° : 4″·4 : gold, bl. Test for moderate instruments.

β 1176. $111^h\ 7{\cdot}6^m$, N 77° 22′ : 5·7, 12·5, 13·3 : 277°·6. 277°·9 : 1″·2, 10″·9.

Σ 419. $111^h\ 32{\cdot}7^m$, N 69° 32′ : 7·2, 7·2 : 73° : 3″·1 : v. w.

Σ 460. $111^h\ 53{\cdot}3^m$, N 80° 26′ : 5·2, 6·1 : 352°·6 : 0″·9 : y., blsh., '30. Ha., 41°·2, '90. Bin.

Σ 2326. $XVIII^h\ 15{\cdot}1^m$, N 81° 28′ : 7·7, 8·7 : 201°·7 : 15″·6 : w., ash.

κ (Σ 2675). $XX^h\ 12{\cdot}3^m$, N 77° 25′ : 4, 8 : 124° : 7″·4 : grnsh. w., bl. Wh. or ysh., bl., '50.

β 1134. $XX^h\ 19{\cdot}8^m$, N 63° 41′ : 5·8, 12·7 : 80°·8 : 4″·3.

Σ 2685. $XX^h\ 21{\cdot}5^m$, N 63° 51′ : 8·5, 9·1 : 348°·8 : 4″·2 : w.

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Σ 2687. xx^h 24·0^m, N 56° 19′ : 6·5, 8·3 : 119° : 26″·2 : w., ash.

Σ 3133. xx^h 55·3^m, N 60° 57′ : 7·4, 8·9 : 102°·4 : 3″·6 : ysh., ash.

β 1139. xx^h 59·2^m, N 56° 40′ : 6, 12·5 : 138°·6 : 1″·9.

Σ 2751. xx^h 59·4^m, N 56° 16′ : 6, 7 : 344°·1 : 1″·9 : v. w.

Σ 2764. xxi^h 3·3^m, N 61° 46′ : 8, 8·5 : 302°·2 : 6″·8 : w.

Σ 2771. xxi^h 3·7^m, N 70° 22′ : 8·8, 8·8 : 212°·6 : 2″·7 : o.

Σ 2766. xxi^h 4·4^m, N 58° 36′ : 8·3, 8·5 : 249°·3 : 5″·1 : w.

Σ 2780. xxi^h 9·3^m, N 59° 34′ : 6·2, 7·2 :.228°·8 : 1″·1 : w. Pale ruby, 7·5, *v f.*

Σ 2783. xxi^h 11·3^m, N 57° 53′ : 8, 8 : 43°·2 : 1″·3 : w.

Σ 2790. xxi^h 16·5^m, N 58° 12′ : 5·6, 9·9 : 46°·6 : 4″·5 : R., bl., '32. Se., 5·6, y., '57; orange, 9-in. spec., '71.

Σ 2796. xxi^h 17·6^m, N 78° 11′ : 7·3, 8·8 : 43°·8 : 24″·6 : w., ashy.

Σ 2801. xxi^h 21·6^m, N 79° 55′ : 7·3, 8 : 273°·1 : 1″·4 : y., ashy y.

Σ 2807. xxi^h 23·3^m, N 82° 5′ : 8·2, 8·3 : 319°·6 : 2″·4 : w.

OΣ 440. xxi^h 24·7, N 59° 19′ : 6·2, 10·5 : 188°·8 : 12″·7 : gold, o.

β (Σ 2806). xxi^h 27·4^m, N 70° 7′ : 3, 8 : 250°·0 : 13″·6 : grnsh. w., bl. W., bl., '50.

Σ 2810. xxi^h 31·7^m, N 58° 40′ : 7·5, 8·5 : 290° : 16″·9 : o.

Σ 2812. xxi^h 32·0^m, N 59° 14′ : 8·7, 9·2 : 126°·4 : 2″·1 : ysh.

Σ 2813. xxi^h 33·0^m, N 57° 2′ : 8·5, 9 : 272°·8 : 10″·1 : w.

Σ 2816. xxi^h 35·9^m, N 57° 2′ : 6·3, 7·9, 8 : 120°·1 : 339°·7 : 11″·7 : 20″ : ysh., blsh. w. β sees *comes* to 6·3 : 13·7 : 323°·5 : 1″·5. Es. *comes* 11·5 : 351°·9 : 54″.

Σ 2819. xxi^h 37·3^m N 57° 8′ : 7·5, 8·5 : 57°·2 : 12″·4 : w.

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Σ 2827. XXI^h 40·8^m, N 63° 9′ : 8·5, 9 : 210°·6 : 4″·3 : w.

Σ 2837. XXI^h 42·0^m, N 82° 28′ : 8·5, 9 : 321°·3 : 2″·2 : w., '32. Ha., 298°·6 : 2″·4, '89. Bin.

OΣ 451. XXI^h 48·0^m, N 61° 8′ : 7·2, 8·2 : 222°·9 : 4″·5.

Σ 2858. XXI^h 48·4^m, N 86° 25′ : 8·5, 8·7 : 164°·3 : 15″ : w.

Σ 2840. XXI^h 48·6^m, N 55° 19′ : 6, 7 : 194°·1 : 20″ : grnsh. w., blsh. w. A splendid pair. Es., 6, pale y.

Σ 2843. XXI^h 49·1^m, N 65° 17′ : 7, 7·2 : 133°·5 : 2″·4 : ysh.

Σ 2845. XXI^h 49·5^m, N 62° 38′ : 8·2, 8·3 : 169° : 2″·2 : yw., '32. Bin.?

OΣ 457. XXI^h 52·8^m, N 64° 51′ : 6·3, 8·5 : 241°·7 : 1″·4.

Σ 2860. XXII^h 0·1^m, N 60° 22′ : 7·7, 9·3 : 250°·8 : 3″·3 : v. y., bl., '32. Ha., 255°·4 : 6″·8, '89.

15 (OΣ 461). XXII^h 0·6^m, N 59° 20′ : 5·9, 10·6 : 299°·8 : 11″·1 : y., o.

ξ (Σ 2863). XXII^h 0·9^m, N 64° 8′ : 4·7, 6·5 : 288°·9 : 5″·6 : y., bl., '31. Es., 282°·2 : 6″·8 : '92. Bin., c.p.m., w., tawny or ruddy, '50.

Σ 2873. XXII^h 2·0^m, N 82° 23′ : 6·2, 7 : 77°·3 : 13″·8 : w. Fr., ysh., blsh.,' 76.

19 (β 697). XXII^h 2·1^m, N 61° 48′ : 5·7, 11·5 : 94°·4 : 19″·9.

Σ 2870. XXII^h 4·8^m, N 60° 38′ : 8·2, 9·2 : 271°·6 : 5″·4 : w.

Σ 2872. XXII^h 5·4^m, N 58° 47′ : 7·2, 8, 8 : 316°·7 : 21″·4. BC., 334°·5 : 0″·5 : v. w. Ha., BC. : 7, 8 : 139°·1 : 0″·6, '85. Bin. Just *p* λ : a little *n* of ζ.

Σ 2883. XXII^h 8·4^m, N 69° 38′ : 6·2, 8·2 : 254°·7 : 14″·9 : blsh. w., bl. Fr., 6·2 : ysh., '76.

Σ 2893. XXII^h 11·1^m, N 72° 49′ : 5·5, 7·6 : 348°·6 : 28″·8 : ysh., w.

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Σ 2896. xxiiʰ 15·2ᵐ, N 62° 43′ : 7·5, 8·5 : 241°·9 : 21″·5 : w., blsh.

Σ 2903. xxiiʰ 18·8ᵐ, N 66° 12′ : 7, 8 : 96°·5 : 4″·2 : y., bl.

δ (Σ I 58). xxiiʰ 25·4ᵐ, N 57° 54′ : var., 5·3 : 192°·0 : 40″·9 : v. y., bl. Especially fine pair, somewhat like β Cygni. C.p.m., large star var., discovered by Goodricke, from 3·7 to 4·9 in 5ᵈ 8ʰ 47ᵐ 39·974ˢ. Schm. suspects var. in many stars of Cepheus. Es., large field, 6ᵐ *f.*, has three orange red stars.

Σ 2923. xxiiʰ 30·4ᵐ, N 69° 51′ : 6·9, 9·2 : 46°·4 : 9″·3 : w., ash.

OΣ 480. xxiiʰ 42·1ᵐ, N 57° 33′ : 7·5, 8·2 : 117°·3 : 30″·9.

Σ 2947. xxiiʰ 45·6ᵐ, N 68° 2′ : 7·2, 7·2 : 76° : 3″ : w., '32. Ha., 66°·4 : 3″·7, '89. Bin.

Σ 2948. xxiiʰ 46·0ᵐ, N 66° 1′ : 7, 8·7 : 5°·3 : 2″·8 : yw., bl. w.

Σ 2950. xxiiʰ 47·4ᵐ, N 61° 10′ : 5·7, 7 : 319°·1 : 2″ : y., ash. Es., 308°·7 : 1″·9, '92. Bin. Fl., naked eye star, yet missed by F., P., and Ll.

OΣ 482. xxiiʰ 47·9ᵐ, N 82° 37′ : 5·2, 9·9 : 31°·0 : 3″·3 : vy., o.

Σ 2963. xxiiʰ 51·7ᵐ, N 75° 48′ : 7·8, 8·5 : 354°·4 : 2″·4 : w.

Σ 2961. xxiiʰ 52·6ᵐ, N 62° 20′ : 8, 8 : 348°·6 : 2″ : w.

Σ 2971. xxiiʰ 54·6ᵐ, N 77° 57′ : 7·3, 8·5 : 5°·2 : 5″·3 : ysh., ash.

π (OΣ 489). xxiiiʰ 4·7ᵐ, N 74° 51′ : 5·2, 7·5 : 352°·4 : 1″·1 : v. y., purp., '46. Ha., 27°·4 : 1″·2, '85. Bin.

Σ 2996. xxiiiʰ 9·1ᵐ, N 81° 17′ : 8·3, 8·7 : 109°·2 : 4″·9 : w.

o (Σ 3001). xxiiiʰ 14·5ᵐ, N 67° 34′ : 5·2, 7·8 : 175°·0 : 2″·4 : v. y., v. bl., '32. Ha., 195°·0 : 2″·8, '85. Bin., c.p.m., y., ysh. green : not remarkable as a contrast, '50.

[CEPHEUS]

Σ 3011. XXIII^h 20·3^m, N 76° 31′ : 8·5, 8·8 : 334°·8 : 6″·9 : w.

β 386. XXIII^h 22·0^m, N 70° 8′ : De., 6·5, 11·9 : 312°·3 : 20″·1.

Σ 3017. XXIII^h 23·7^m, N 73° 34′ : 7·1, 8·2 : 35°·4 : 2″·4 : w.

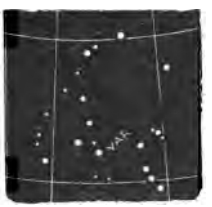
β 996. XXIII^h 47·5^m, N 74° 59′ : 6·4, 12·5 : 68°·0 : 5″·8.

Σ 3052. XXIII^h 57·8^m, N 70° 47′ : 7·2, 7·8 : 7°·9 : 33″·5 : w.

Stars with Remarkable Spectra and Variables.

δ see under Double Stars.

U (var.). 0^h 53·4^m, N 81° 20′ : 7·1 to 9·2 in 2^d 11^h 49^m 38·25^s. Type of Algol, Ceraski. Blsh. at max. Ruddy at min., according to K. Incr., decr., and min. each 2^h. A diagram from one published by Lord Lindsay will assist in finding this wonderful object. K. and β two *comites*; nearest β : 11·2 : 62°·3 : 13″·8.



R (var.). XIX^h 58·9^m, N 88° 50′ : 5 ? 10 ? Irreg. Pogson.

T (var.). XXI^h 8·2^m, N 68° 5′ : 5·2–6·8 to 9·5–9·9. Per., 383·3^d. Ceraski.

Es-Birm. 703. XXI^h 10·2^m, N 59° 42′ : 7·5 : R. : Con. des Temps. Var. B.

Es-Birm. 706. XXI^h 23·3^m, N 62° 8′ : 8·8 : VR : III : Es.

S (var.). XXI^h 36·5^m, N 78° 10′ : 7·4–9·2 to 11·5. Per., 484^d. Hencke. Type IV.

μ (var.). XXI^h 40·4^m, N 58° 19′ : 4 ? to 5 ? Irreg. The celebrated 'Garnet sidus' of H., visible to naked eye. H. says, 'It is of a fine deep garnet col.,' especially after viewing a w. star, such as α. 2½° s of ν. Deep orange, not

[CEPHEUS]

crimson, $5\frac{1}{2}$-in., '64. So Slack, '65, and $9\frac{1}{3}$-in. spec., '67. Wide pair 45′ *p*, 10′ *n*. β has *comes* to μ : 12 : 259°·4 : 19″·2.

18. XXII^h 0·9^m, N 62° 38′ : 5·9 : Ry : III : Du.

Es-Birm. 725. XXII^h 9·0^m, N 56° 47′ : 8·5 : R. in cl. h.

Es-Birm. 729. XXII^h 21·3^m, N 57° 25′ : 9·2 : R : E. of Rosse.

Clusters.

6939 (H. VI 42). XX^h 29·4^m, N 60° 18′. An obscure cl. of very minute stars.

7654 (M. 52). XXIII^h 19·8^m, N 61° 3′. Irreg. with or. star, as is frequently the case.

CETUS.

The largest, but far from the most interesting constellation. Its alphabetical leader α is now inferior to β: one or both may have changed. Huggins finds spectrum nearly as α Orion. α is worth looking at, as a fine combination of a beautiful 2·5 m^s. or. star with a 5·5 m^s. fine blue. Between them *f* is a pair 11 m^s., the *s* of which Wa. doubles, 11, 11. Copeland, 225° : 10″·25. Gore, two minutes *comites p* a^2.

Double Stars.

33 (β 486). 0^h 9·4^m, S 8° 21′ : 5, 11 : 5°·3 : 3″·1.

12 (h. 322). 0^h 25·0^m, S 4° 31′ : β 6, 10·7 : 187°·0 : 8″·6.

Σ 39. 0^h 29·4^m, S 5° 6′ : 6·8, 8·5 : 45°·4 : 20″·1 : yw., blsh. Se. and De. double 6·8 : 237°·0 : 0″·4.

82 (β 395). 0^h 32·1^m, S 25° 19′ : 6, 6·1 : 118°·2 : 0″·7. Bin., large c.p.m.

Σ 49. 0^h 35·3^m, S 8° 12′ : 6·5, 10 : 321°·5 : 4″·5.

h 323. 0^h 35·6^m, S 4° 54′ : β 6·2, 8·7 : 289°·9 : 65″·1. Y.. violet, '50.

[CETUS]

β 494. $0^h\ 41{\cdot}9^m$, S 1° 48′ : 8, 8·2 : 170°·6 : 1″·4.

β 1160. $0^h\ 44{\cdot}3^m$, S 14° 6′ : 5·8, 12 : 113°·1 : 1″·2.

26 (Σ 84). $0^h\ 58{\cdot}7^m$, N 0° 50′ : 6·6, 9 : 252°·0 : 16″ : w., ash. Pale y., bl., '55.

Σ 86. $0^h\ 59{\cdot}7^m$, S 6° 1′ : 8·2, 8·7 : 171° : 12″·1 : w. Ha., 159°·2, '85.

Σ 91. $1^h\ 2{\cdot}1^m$, S 2° 16′ : 6·7, 7·5 : 328°·8 : 3″·9 : ysh., w. Sch., 322°·5, '82.

37 (Σ I 3). $1^h\ 9{\cdot}3^m$, S 8° 28′ : 5·1, 7·0 : 331°·4 : 50″·1 : ysh., o. Y., lilac or violet, '50. Σ, c.p.m. *n p* lies another pair, Σ 101 : 7·5, 9·8 : 339°·3 : 21″·3 : y., o. Es., 9·8 : bl. 2° *p θ*.

Σ 106. $1^h\ 11{\cdot}3^m$, S 7° 41′ : 8·6, 8·7 : 308°·6 : 4″·6 : o.

Σ 110. $1^h\ 12{\cdot}8^m$, S 12° 52′ : 8, 8·5 : 356°·8 : 7″·3 : v. w.

42 (Σ 113). $1^h\ 14{\cdot}7^m$, S 1° 2′ : 6·2, 7·2 : 333°·6 : 1″·2 : w. Ha., 349°·9, '86. Bin.

h. 2036. $1^h\ 15{\cdot}0^m$, S 16° 20′ : Wilson, 7, 7·5 : 23°·9 : 1″·4.

β 1163. $1^h\ 19{\cdot}3^m$, S 7° 26′ : 6, 6·2 ; 192°·3 : 0″·2.

β 399. $1^h\ 22{\cdot}8^m$, S 11° 25′ : De., 6·3, 10 : 302°·3 : 1″·6.

Σ 150. $1^h\ 38{\cdot}4^m$, S 7° 35′ : 7·2, 7·8 : 195°·5 : 36″·2 : v. w. Beautiful.

β 6. $1^h\ 39{\cdot}7^m$, S 7° 16′ : De., 6·5, 9·2 : 167°·1 : 2″·6.

Σ 171. $1^h\ 43{\cdot}7^m$, S 1° 56′ : 8·5, 8·5 : 157°·6 : 27″·9 : w. β 159°·9 : 30″·2, '91. β doubles *comes*, 8·2, 11·6 : 317°·4 : 3″·9.

χ. $1^h\ 44{\cdot}7^m$, S 11° 10′. Forms a fine wide pair with P. I 182 : 5, 7·5 : pale y., blsh. Closely *s p* ζ.

58 (β 7). $1^h\ 52{\cdot}9^m$, S 2° 33″ : 6·2, 11·0 : 12°·8 : 2″·7. Test for 6-in. achr. About 2° *sp* 61. P could not find 58.

h. 647. $1^h\ 57{\cdot}4^m$, N 7° 12′ : 10, 10½ est. 50° : 30″. Blood red, green. "Very intense and remarkable." β col. not

very striking. Es., 9 fine red, with III Type spectrum. Nearly 5° *n* of *a* Piscium.

61 (H. V 102). 1h 58·7m, S 0° 49′ : *β* 7, 11 : 193°·3 : 42″·7. Attendant very obvious with averted eye, 7 pale or., '50. B. another *comes* : 13 : *β* 326°·3 : 80″. Followed a little *s* by Σ 218 : 7, 8 : 250° : 4″·8 : w., bl. A little *p* a pale ruby with distant *comes* 11 ms., and *sp.* a 7 ms. star with 2 small attendants, 61 is 3° *s* a little *f a* Piscium.

66 (Σ 231). 1h 7·7m, S 2° 52′ : 6, 7·8 : 228°·9 : 15″·5 : ysh. bl. Rapid c.p.m.

Σ 265. 1h 19·4m, S 2° 13′ : 8·2, 8·7 : 136°·6 : 12″ : w. 24 sec. *f.*, 21′ *s* is Σ 266 : 8·2, 8·7 : 268°·3 : 7″·4 : v. w.

β 518. 1h 24·2m, N 9° 7′ : 6·4, 11·3 : 138°·7 : 1″·7.

Σ 274. 1h 26·3m, N 0° 39′ : 7·2, 7·7 : 218°·2 : 13″·5 v. w.

Σ 276. 1h 27·4m, N 5° 54′ : 8·8, 8·8 : 253°·3 : 2″·3 : o.

Σ 280. 1h 29·1m, S 6° 4′ : 7·5, 7·7 : 349°·8 : 3″·8 : ysh.

ν (Σ 281). 1h 30·6m, N 5° 10′ : 5, 9·6 : 83°·3 : 7″·7 : y., ash.

84 (Σ 295). 1h 36·1m, S 1° 8′ : 6, 9·2 : 334°·6 : 4″·9 : y., ash. Wilson, 323°·8, '85. Bin., c.p.m.

γ (Σ 299). 1h 38·1m, N 2° 48′ : 3, 6·8 : 287°·4 : 2″·6 : ysh, ash. So far probably no motion save c.p.m. 6·8 tawny, '50. De., olive grn., '54. Ash, '65. Fr., ruddy or dusky, '76.

Σ 313. 1h 44·5m, N 8° 32′ : 8·7, 9 : 191° : 5″·4 : o.

Σ 323. 1h 47·4m, N 6° 4′ : 8, 8 : 283°·2 : 2″·5 : v. w.

Σ 330. 1h 52·1m, S 0° 59′ : 7·5, 9·5 : 191°·1 : 8″·8 : v. y., blsh.

Σ 332. 1h 52·7m, N 0° 0′ : 8·5, 8·5 : 52°·9 : 12″·7 : w.

Σ 334. 1h 54·1m, N 6° 15′ : 7·7, 8·2 : 322°·8 : 1″·6 : w.

β 528. 3h 3·4m, S 3° 58′ : 8·5, 8·5 : 197°·5 : 1″. In field with Σ 358 : 8·5, 11·3 : 349°·3 : 15″·2 : w. o.

[CETUS]

Σ I. 6. $3^h\ 3{\cdot}8^m$, N 7° 5′ : 7, 7 : 162°·6 : 81″ : w.

94 (h. 663). $3^h\ 7{\cdot}7^m$, S 1° 34′. De., 5·5, 11·5 : 253°·1 : 5″·1 : y., o. h., 19 m., β not easy 6-in. achr.

Σ 367. $3^h\ 8{\cdot}9^m$, N 0° 22′ : 8, 8 : 101°·4 : 0″·9 : yw. Tarrant, 230°·7 : 0″·7, '90. Bin.

95 (AC 2). $3^h\ 13{\cdot}3^m$, S 1° 17′, β 6, 8·5 : 112°·8 : 0″·4, β single, '90, '91. Bin.

Σ 3046. $23^h\ 51{\cdot}3^m$, S 10° 4′ : 8, 8·5 : 232°·2 : 2″·5 : yw. Wilson, 246°·8 : 2″·9, '85. Bin., c.p.m.

Stars with Remarkable Spectra and Variables.

Ll. 158. $0^h\ 9{\cdot}4^m$, S 8° 21′ : 5·8 : III : Pickering.

7. $0^h\ 9{\cdot}6^m$, S 19° 29′ : 5·0 : III : Pickering.

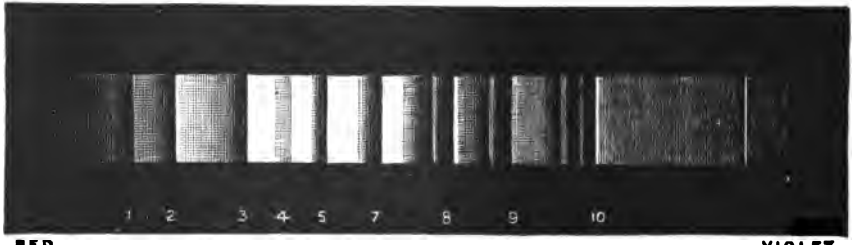
T (var.). $0^h\ 16{\cdot}7^m$, S 20° 37′ : 5·1–5·3 to 6·4–7 : Irreg. Chandler.

S (var.). $0^h\ 19{\cdot}0^m$, S 9° 53′ : 7–8 to 12. Per., 321·0d. Borrelly.

v. $1^h\ 55{\cdot}3^m$, S 21° 34′ : 4·1 : Ry., III : Du.

Ll. 3717. $1^h\ 55{\cdot}5^m$, S 9° 0′ : 5·8 : yr., III : D'A.

o (Mira). $2^h\ 14{\cdot}3^m$, S 3° 26′ : 1·7–5 to 8–9·5 : Per., 331·6d. Fabricius. h., very full ruby; I found no trace of red, '78; *a* was ruddier. Fl., less red than gas flame. There is a *comes* (β 8·2 : 82°·4 : 116″·0) like several other vars. β sees another, 13·0 : 88°·5 : 75″·3. Period and brightness are not always the same. A. has shown the probability of regular alternations in the former to the extent of 25d. One of the most interesting problems of modern astronomy is the question whether the irregularities of var. stars may not be, like the *maxima* and *minima* of sun spots, phases of some general law. Se., columnar spectrum. Pickering and Es., hydrogen lines bright at max.,



SPECTRUM OF MIRA CETI ACCORDING TO ES.

To face p. 85.

[CETUS]

but not *C* and *F*. Es. finds similarity betwen the spectra of Mira and Nova Aurigæ, while the Nova had bright lines on the less refrangible side, flanked by dark ones on the more refrangible side, Mira has the reverse. Almost all the variables of type III show bright violet hydrogen lines at max.; but only R Androm., S Cass., R Cygni, and R Gem., have *F* bright as well.

R (var.). 1^h $20{\cdot}9^m$, S 0° 38′ : 7·5–8·8 to 13·5 : Per., $167{\cdot}1^d$. Argelander.

U (var.). 1^h $28{\cdot}9^m$, S 13° 35′ : 6·8–7·3 to 10·5 : Per., $235{\cdot}8^d$. Sawyer.

V (var.). 23^h $52{\cdot}8^m$, S 9° 31′ : 8·5–9·5 to 14? : Per., 261^d? Peters.

Nebulæ.

584 (H. I 100). 1^h $26{\cdot}3^m$, S 7° 23′. Round, bright centre. E. of Rosse and D'A. another fainter *sf*. Neither found.

936 (H. IV 23). 1^h $22{\cdot}5^m$, S 1° 36′. A faint diffused and very hazy object. Another *f*.

1055 (H. I 1). 1^h $36{\cdot}6^m$, N 0° 1′. Faint neb. Es.

1068 (M 77). 2^h $37{\cdot}6^m$, S 0° 26′. 1° *f* δ, a little *s*. Small, faintish; very near 9 m^s. star. H. thought it at least 900 times more distant than 1 m^s. star! But qu. these inferences now? E. of Rosse, spiral, bl.

COMA BERENICES.

A gathering of stars which obviously requires distance only to become a nebula to the naked eye. Sweeping poor, except nebula.

[COMA BERENICES]

Double Stars.

2 (Σ 1596). $11^h\ 59{\cdot}2^m$, N 22° 1′ : 6, 7·5 : 240°·6 : 3″·7 : w., bl. Yw., rosy, '48.

Σ 1633. $12^h\ 15{\cdot}7^m$, N 27° 37′ : 7·1, 7·2 : 245°·1 : 8″·7 : v. w. very pretty : solitary.

12 (*Hh.* 395). $12^h\ 17{\cdot}5^m$, N 26° 24′ : Σ 4·5, 8·5 : 167°·3 : 66″·1 : o. Y., rosy, '52. *Comes;* pale bl., '72; K., grey lilac, '72; Fr., lilac, '77. $1\frac{1}{2}°$ *sp* 16., the 'lucida' of the constellation, which is beautifully placed in a little triangle of 8 or 9 m^{s}. stars; curious row of 4 stars *p*.

Σ 1639. $12^h\ 19{\cdot}4^m$, N 26° 9′ : 6·7, 7·9 : 290° : 1″·2 : w., ashy w. Sch., 236°·0 : 0″·2, '87. Bin.

Σ 1643. $12^h\ 22{\cdot}3^m$, N 27° 36′ : 8·4, 8·7 : 71°·2 : 1″·9 : w. Ha. 44°·6, '88. Bin.

17 (Σ I 21). $12^h\ 23{\cdot}8^m$, N 26° 29′ : 4·8, 6 : 250°·7 : 145″·4 : w., blsh. w. Fine pair; β doubles 6 : 13·7 : 156°·8 : 1″·8.

Σ 1678. $12^h\ 40{\cdot}4^m$, N 14° 55′ : 6·3, 7 : 211°·6 : 32″·6 : v. w., yw. Perr., 198°·4 : 32″·2, '85.

Σ 1685. $12^h\ 47{\cdot}0^m$, N 19° 43′ : 6·8, 7·3 : 200°·8 : 15″·8 : w. Heis, visible to naked eye, 2° *s* 35.

32 (Σ I 23). $12^h\ 47{\cdot}2^m$, N 17° 37′ : 5·3, 6·1 : 48°·8 : 194″·8 : yw.

35 (Σ 1687). $12^h\ 48{\cdot}4^m$, N 21° 47′ : 5, 7·8, 9 : 25°·3; 124°·7 : 1·4″; 28″·6 : ysh. bl., o. Close pair, β 72°·4 : 1″·2, '91. Bin.

Σ 1696. $12^h\ 52{\cdot}6^m$, N 30° 55″ : 8, 8·2 : 202°·5 : 3″·6 : v. w.

Σ 1699. $12^h\ 53{\cdot}9^m$, N 28° 1′ : 7·8, 7·8 : 1°·2 : 1″·5 : o.

37 (β 1081) $12^h\ 55{\cdot}5^m$, N 31° 20′ : 4·5, 13·8 : 351°·3 : 5″·1.

[COMA BERENICES]

h. 2638. XIII^h 1·6^m, N 29° 33′ : 6, 14, 15 ; β 218°·9 ; 7°·2 6″·5 ; 40″·3. β doubles nearer *comes* 11·5, 11·7 : 237°·3 : 0″·5.

Σ 1722. XIII^h 3·5^m, N 16° 1′ : 7·8, 8·8 : 343°·9 : 3″·5 : ysh., blsh. Ha., 338°·9 : 3″·2, '87. Bin?

42 (Σ 1728). XIII^h 5·1^m, N 18° 4′ : 6, 6 : 9°·5 : 0″·6, '27. Ha., 191°·4 : 0″·5, '91. Bin. 25·71 yrs., Doubjago. Large c.p.m.

OΣ 266. XIII^h 23·5^m, N 16° 15′ : 7·3, 7·8 : 324°·3 : 1″·2 : w. Perr. 338°·4 : 1″·6, '86. Bin.

Σ 1756. XIII^h 28·6^m, N 23° 31′ : 8·5, 9 : 176°·8 : 14″·2 : w.

Σ 1760. XIII^h 29·7^m, N 26° 47′ : 8, 8 : 65° : 8″·5 : w.

Stars with Remarkable Spectra and Variables.

R (var.). XII^h 59·1^m, N 19° 20′ : 7·4–8 below 13·5. Per., 361^d. Schönfeld. A 7.5 ; 10 sec. *p* 3′ *n* : or. : III : Es.

36. XII^h 54·0^m, N 17° 57′ : 4·8 : orange : III : D'A.

40. XIII^h 1·5^m, N 23° 9′ : 5·8 : III : D'A.

Clusters and Nebula.

4147 (H. I 19). XII^h 5·0^m, N 19° 6′. Globular cl.

4251 (H. I 89). XII^h 13·1^m, N 28° 44′. Lengthened.

4274 (H. I 75). XII^h 14·8^m, N 30° 10′. Oblong : nucleus.

4278 (H. I 90). XII^h 15·1^m, N 29° 50′. Nucleus like 10 m^s. star ; a faint neb. *nf* this.

4382 (M. 85). XII^h 20·4^m, N 18° 45′. Fair specimen of the many neb. in this region ; midway from 24 toward 11, the nearest bright star *p*, a little *s*. D'A., fainter neb. *f*.

4494 (H. I 83) XII^h 26·4^m, N 26° 20′. Near star 6 m^s.

4559 (H. I 92) XII^h 31·0^m, N 28° 31′. h., club-shaped.

4565 (H. V 24) XII^h 31·4^m, N 26° 32′. Long streak with parallel patch on *f* edge. 'Extraordinary phenomenon.' E. of Rosse, about 15′, nucleus projecting into dark

[COMA BERENICES]

lane, sky *p* neb. darker than elsewhere. Very faint $3\frac{7}{10}$-in.; well seen, 9-in. spec.

4725 (H. I 84) XII^h 45·5^m, N 26° 3′. Star-like nucl. E. of Rosse, incomplete oval ring round it.

4826 (M. 64) XII^h 51·8^m, N 22° 13′. Magnificent large bright neb. blazing to a nucleus. h., resolvable, nucl. probably double star, with vacuity below it. E. of Rosse, circular shaped, with dark and light spot on one side, around which is a close cluster of well-defined little stars. Rather faint $3\frac{7}{10}$-in.

5024 (M. 53). XIII^h 8·0^m, N 18° 42′. Brilliant mass of minute stars (h., 11–15), blazing in centre. h., curved appendages. E. of Rosse, diam. 3′. Not very bright $3\frac{7}{10}$; beautiful 9-in.

CORONA BOREALIS.

A constellation resembling more than usual the object whose name it bears.

Double Stars.

Σ 1932. XV^h 14·1^m, N 27° 12′ : 5·6, 6·1 (vars.) : 273°·8 : 1″·6 : v. w., '30. Ha., 130°·4 : 0″·9, '86. Bin.

Σ 1935. XV^h 16·1^m, N 31° 4′ : 8·5, 8·7 : 290°·2 : 8″·4 : w.

Σ 1936. XV^h 18·6^m, N 27° 27′ : 8·5, 9 : 231°·9 : 20″·3 : w.

η (Σ 1937). XV^h 19·1^m, N 30° 39′ : 5·2, 5·7 : 35°·3 : 1″·1 : y., '26. Ha., 124°·9 : 0″·5, '81; 218·4° : 0″·6, '91. Split, but difficult, $9\frac{1}{2}$-in. spec., '78., when 0″·6. One of H.'s severest tests. It is interesting to look at so wonderful an object as a pair of suns revolving in the brief per. of 41·56 yrs. (Doberk), even though our instruments cannot separate

[CORONA BOREALIS]

them; c.p.m.; visible to naked eye, a little out of the curve of the coronet. Sm. speaks of a glimpse star *nf*. Winnecke, 26°·3 : 49″. Buffham, 6·2-in. spec. Hunt glimpsed 4-in. achr.

Σ 1941. xv^h 21·5^m, N 26° 59′ : 8·7, 8·7 : 232°·7 : 1″·6 : w., Bin.

Σ 1950. xv^h 25·7^m, N 25° 51′ : 6·7, 8·2 : 93°·2 : 3″·2 : gold, bl.

Σ 1963. xv^h 33·8^m, N 30° 26′ : 7·3, 7·7 : 291°·2 : 4″·2 : w. B., small pair, near.

Σ 1964. xv^h 34·4^m, N 36° 34′ : 6·8, 7·3 : 86°·0 : 15″·4 : ysh. Σ *comes* double : 8·8 : 8°·1 : 1″·3.

ζ (Σ 1965). xv^h 35·6^m, N 36° 58′ : 4·1, 5 : 300°·9 : 6″ : grnsh. w., grnsh Flushed w., blsh. grn., '50.

γ (Σ 1967). xv^h 38·5^m, N 26°·36′ : 4, 7 : 111° : 0″·7 : grnsh. w., purp., '26. Ha., 125°·6 0″·4, '91. Bin. Per., 85·27 yrs. (Celoria).

Σ 1973. xv^h 42·7^m, N 36° 45′ : 7·3, 8·5 : 323°·4 30″·6 : w.

ε (A.G.C. 8). xv^h 53·5^m, N 27° 10′ : β 4, 12·5 : 360°·2 : 1″·9. Bin.

τ (β 1087). xvi^h 5·3^m, N 36° 45′ : 5½, 13·8 : 169°·1 : 3″·1

Σ 2029. xvi^h 9·8^m, N 28° 59′ : 7·5, 9·3 : 187°·5 : 6″·3 : w., o.

σ (Σ 2032). xvi^h 11·0^m, N 34° 6′ : 5, 6·1, 134°·7 : 1″·4 : ysh., blsh., '36. β 207°·8 : 4″·1, '90. Bin. Per., 845·86 yrs., Doberk. Great divergence as to cols. South *comes* 'certainly not bl.; it differs very little from the large star in col.,' '25. De., w., sometimes y, sometimes ashy, '54–'78. Se., *comes* sometimes bl., sometimes y., '55–7. K., v. pale y., bl., '71; *comes* sometimes ruddy, sometimes blsh. to me, '50–'55, '62. Se., m^m. very discordant. De., 5·3, 6·5, '54–5, mean from '63–'78; 5·8, 6·7., more than ½ diff. to me,

[CORONA BOREALIS]

'55–'62. Σ *comes* 10·5 : 88°·8 : 43″·7, '36, 15 or 20 m^s. South '25, not visible with more than 92 of very fine 5-in. achr., yet readily seen by me with 80, 144, 250 of $3\frac{7}{10}$-in., '50. Fr., 10 m^s., '76. β distance 55″·8, '80, from p.m. of σ. H., still minuter *comes* 13 m^s. Ha., 221°·7 : 15″·9, '76. β 213°·2 : 12″·5, '90. Also from proper motion of σ.

ν (Σ I 29). XVI^h 18·7^m, N 33° 56′ : 4·8, 5·1 : 165°·6 : 371″·9 : y. Stars equal, both deep y., '55, and a 6 m^s. grey star *f*. 5½-in. showed H.'s minute *comes* to ν¹ (β 10·5 : 236°·6 : 66″·4). ν² has a *comes*, 10 m^s., '50–'55 (β 15°·6 : 104″·6).

Stars with Remarkable Spectra and Variables.

U (var). XV^h 14·1^m, N 32° 1′ : 7·5 to 8·9. Per., 3^d 10^h 51^m 12·4^s. Algol type. Winnecke.

S (var). XV^h 17·3^m, N 31° 44′ : 6·1–7·8 to 11·9–12·5. Per., 360·6^d. Hencke.

R (var). XV^h 44·4^m, N 28° 28′ : 5·8 to 13. One of the most remarkable variables in the heavens, remaining sometimes for a year without any alteration in light, sometimes falling rapidly. Es. finds var. in col. sometimes faint yellow, at others decided orange. The spectrum is unique, having bright lines, but probably not those of hydrogen. Sometimes bands appear. The bright lines have dark lines, as the star turns to orange, on the more refrangible side.

V (var.). XV^h 46·0^m, N 39° 52′ : 7·2–7·7 to 10·3–12. Per., 359·5^d. IV type. Dunér.

Es-Birm. 446. XV^h 54·8^m, N 36° 18′ : 8·8 : R. : h. III : Es.

T (var.). XV^h 55·3^m, N 26° 12′ : 2·0 to 9·5. The 'Blaze star' with a double spectrum from the addition of the bright lines of hydrogen, discovered by B., 2 m^s., '66, May 12; 8·5, May 24, afterwards to 9 m^s.; reviving 7 and

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7·5 m^s., Aug. 20, Oct. 5. This marvellous object should be carefully watched, especially as it had previously shown signs of unsteadiness. Backhouse found it still irregularly decreasing, '72. h. gave it 6·3 m^s., '42. A., 9·5 m^s., '55. Baxendell, at one time buff, with a tinge of bl. over it. See o^2 Cygni. Es., April 9, '92, 9·1 m^s. Type III.

CORVUS.

This small constellation contains several conspicuous stars.

Double Stars.

β 920. XII^h 10·6^m, S 22° 47′ : 6·5, 7·0 : 232°·4 : 0″·8.

β 921. XII^h 12·8^m, S 23° 27′ : 7·5, 11·6 : 218°·5 : 3″·1.

β 605. XII^h 15·0^m, S 21° 37′ : 6·2, 8·4 : 143°·8 : 1″.

ζ (β 1245). XII^h 15·4^m, S 21° 39′ : 5·5, 13·8 : 42°·3 : 4″·8.

β 606. XII^h 20·8^m, S 14° 24′ : 7·2, 8·2 : 99°·1 : 1″·2.

β 28. XII^h 24·9^m, S 12° 50′ : De., 6·4, 10·2 : 353°·7 : 1″·8, '75. β, 8°·3, '91. Bin.

δ (H*h*. 396). XII^h 24·7^m, S 15° 57′ : De., 3, 8·5 : 214° : 24″·3. Yw., lilac, '51.

Σ 1664. XII^h 33·1^m, S 10° 58′ : 7·7, 8·8 : 271°·6 : 17″·1 : y., bl., '30. Wilson, 248°·4 : 21″·6, '86.

Σ 1669. XII^h 36·1^m, S 12° 28′ : 6·5, 6·5 : 298°·9 : 5″·4 : yw. Sa., *comes* 10·5 m^s.

Stars with Remarkable Spectra and Variables.

R (var.). XII^h 14·5^m, S 18° 42′ : 6·8–7·4 below 11·5. Per., 317·2^d. Karlinski. 5 sec. *f*, 4′ *n* is a 7·8 : yr. : III. Du.

β. XII^h 29·1^m, S 22° 50′ : pale y., '52, is inserted to be watched for var. Sm. found, '31, that though possessing no Arabic name, and lettered β by Bayer, it was unquestionably

[CORVUS]

the brightest in the constellation. H., 1783, gave the order γ, δ, β, α; 1796, γ, β, δ, α, with but little diff. between them; I found them, '52, '54, '59, '61, γ, δ, β, α; Fr., '78, γ, δ, β, ε, α.* Pickering finds the spectra of γ, δ of the first type, while α, ε, β are varieties of type two. The diff. of colour may have something to do with the apparent var.

Nebula.

4361 (H. I 65). $12^h\ 19{\cdot}4^m$, S 18° 13′ : H., resolvable. Nucleus.

CRATER.

Like Corvus, an appendage to Hydra.

Double Stars.

Σ 1509. $11^h\ 1{\cdot}5^m$, S 12° 52′ : 7·2, 9 : 15°·2 : 32″·9 : y., o.

β 220. $11^h\ 7{\cdot}5^m$, S 17° 57′ : De., 6·4, 6·9 : 143°·6 : 0″·6 : w.

Σ 1530. $11^h\ 14{\cdot}7^m$, S 6° 21′ : 7·8, 8·2 : 314°·6 : 7″·6 : w. A 10 m^s. pair in field. About 45′ *p* is a fine pair. H*h*., 368 : 7, 9 : w., blsh. : 97°·6 : 67″·1, '23. β, 60″·7, '80. β doubles principal star : 6½, 12 : 226°·4 : 1″·2.

β 1078. $11^h\ 34{\cdot}8^m$, S 13° 55′ : 6·3, 12·2 : 49°·8 : 8″·2.

β 1079. $11^h\ 55{\cdot}6^m$, S 21° 17′ : 6·2, 13·3 : 147°·9 : 11″·7.

* Gould, in his admirable "Uranometria Argentina," considers that β, γ, δ, ε are all subject to change; and expresses his firm conviction that a very large proportion of the fixed stars, probably at least one-half above 7 m^s. (the limit of naked-eye visibility at Córdoba), fluctuate in brightness, to an extent which might be detected by such careful observations as his own.

[CRATER]

Star with Remarkable Spectra and Variable.

R (var.). x^h 55·6^m, S 17° 47′ : 8? to 9? Irreg. h., 'scarlet, almost blood colour; a most intense and curious col.' Closely *f a*. Variation discovered by Baxendell. A star 9 m^g. (K., 10, '66), pale bl., *p*.

Es-Birm. 336. xi^h 46·0^m, S 10° 39′ : 8·4 : R. : III. Es.

CYGNUS.

This fine cruciform constellation occupies a prominent position in the Galaxy, and its low-powered fields are overpowering in magnificence. The region *s* of γ is remarkable as containing many red stars (which led B. to call this part of the heavens the 'Red Region of Cygnus'), also there is here a group of V type stars. The principal star, Deneb, has no perceptible parallax or proper motion; so far deserving the title, usually very inappropriate, of a fixed star; hence we must infer amazing distance, and magnitude surpassing possibly that of Arcturus, Wega, or even Sirius itself. Huggins believes that it is approaching us at about 39 miles per second. The Galaxy near γ begins to separate into two streams. Pickering finds that Sirian stars have a marked affinity for the Galaxy, and Monck that solar stars lie usually outside of it, and are more uniformly distributed, and have larger proper motions. Hence it is inferred that the solar stars are separate from the Sirian, and nearer to us. Du. notes that IV type stars are mainly found near the medial line of the Galaxy, and the further they are from it the brighter they are. Es. finds that the V type stars accumulate at the bifurcation of the Milky Way in Cygnus and Scorpio. Almost all the temporary stars have appeared in this part of the heavens. Planetary nebulæ are also

closely associated with the Milky Way, and it is a highly suggestive fact that while the Nova Aurigæ turned into a planetary nebula, we have no case of a nebula condensing into a star.

Double Stars.

Σ 2486. XIX^h 9·5^m, N 49° 38′ : 6, 6·5 : 224°·8 : 10″·5 : y., '32. Equal 9-in. spec., '71; so Fr., '76. C.p.m. singular and beautiful field.

Σ 2507. XIX^h 16·6^m, N 44° 11′ : 8·2, 9·3 : 136°·7 : 23″·9 : w., o. h., *comes* to 9·3.

β 1129. XIX^h 19·2^m, N 52° 11′ : 6·3, 6·3 : 344°·3 : 0″·3.

Σ 2522. XIX^h 21·8^m, N 28° 34′ : 7·5, 9 : 339°·2 : 4″·4 : w., o.

Σ 2524. XIX^h 22·5^m, N 25° 18′ : 8·3, 8·5 : 104°·6 : 7″·2 : w.

Σ 2525. XIX^h 22·5^m, N 27° 7′ : 7·4, 7·6 : 255°·9 : 1″·3 : ysh. Not separated 26-in., Ha., '86.

Σ 2534. XIX^h 24·1^m, N 36° 19′ : 7·8, 8 : 62°·0 : 6″·8 : v. w. W., bl., '50. Fine field : closely *f* 4, 5 m^s.

Pair. XIX^h 25·7^m, N 28° 31′ : 7·5, 12 : est. 90° : 40″ : r., intense bl. B.

β (Σ I 43). XIX^h 26·7^m, N 27° 45′ : 3, 5·3 : 55°·7 : 34″·3 : y., bl. One of the finest in the heavens. I have seen the cols. beautifully by putting the stars out of focus. Sm. observes that they are actually different, not, as may sometimes be the case, complementary, from mere contrast; an effect which is seen when the bright y.-light of a lamp makes the moon appear blue, and which Schm. witnessed to a remarkable degree at his observatory on Vesuvius during the great eruption of '55, when the sky was as green as bottle glass, and the full moon a lively green through

openings in red clouds of smoke and steam. A similar result may take place with some double stars, but not with all, as is proved by hiding the larger star behind a bar in field. Hence artificial light is misleading in estimating star cols. 3 has been suspected of var. Huggins finds the spectra of the pair complementary, and Pickering's photos show bright lines.

Σ 2538. XIX^h 27·8^m, N 36° 29′ : 8·2, 8·3 : 245°·3 : 53″ : w. : 8·3 has *comes* 8·7 : 52°·6 : 6″·1. *β comes* to 8·2 : 13, 40°·9 : 4″·4, and a minute star between the pairs.

Σ 2539. XIX^h 28·1^m, N 28° 3′ : 7·9, 9·7 : 5°·2 : 5″·4 : v. w., o. *β comes* 13 : 328° : 4″·8.

Σ 2542. XIX^h 29·6^m, N 52° 45′ : 8·2, 8·7 : 254°·1 : 11″·3 : w.

Group ±. XIX^h 30^m, N 28° 22′. Two pairs and triplet.

θ (*β* 1131). XIX^h 33·7^m, N 50° 0′ : 5, 14·3 : 43°·9 : 3″·6.

OΣ 382. XIX^h 37·8^m, N 27° 8′ : 7·7, 7·6 : 355°·3 : 0″·3. 2 m *f*, 16′ *n* is *β* 658 : 6·5, 10 : 295°·2 : 0″·6.

16 (Σ I 46). XIX^h 39·2^m, N 50° 18′ : 5·1, 5·3 : 136°·3 : 37″·3 : yw.; c.p.m., another smaller and wider pair in field, 1° *n f θ*.

OΣ 384. XIX^h 40·2^m, N 38° 5′ : 7, 7·3 : 195°·9 : 1″.

Σ 2576. XIX^h 41·8^m, N 33° 23′ : 7·8, 7·8 : 318°·8 : 3″·6 : y. Perr., 119°·5, '86.

δ (Σ 2579). XIX^h 41·9^m, N 44° 53′ : 3, 7·9 : 37°·9 : 1″·8 : grnsh., ash. Ha., 310°·1 : 1″·5, '90. K., 7·9, fine bl. Difficult with moderate apertures because *comes* falls on interference ring; often easy in twilight, but invis. in a dark sky,* has been thought var. Seen finely by Buffham

* The celebrated observer, Dr. Dunér, of Lund (Sweden), who uses a very fine 9$\frac{1}{10}$-in. Merz. achr., says, 'Rarement j'ai observé l'étoile après le coucher du soleil. Ce qui a été dit de δ Cygni peut

with 6½ of 9-in. 'With' spec., and Noble, 4½-in. achr. Bin. Per., 376·6 yrs. Gore. C.p.m., D., pair, 12′ *n* : 7·5, 11·25 : 266° : 2″·3. Another pair, 6ᵐ *f*, not in Σ, Es., triple 8·5, 9·2, 11·5 : 327°·8 : 138°·8 : 30″·2 : 7″·7 : y., two bl. with distant *comes*.

Σ 2578. XIXʰ 42·0ᵐ, N 35° 50′ : 6·6, 7·4 : 126°·8 : 14″·8 : v. w. Wa., several minute *comites*.

OΣΣ 191. XIXʰ 42·1ᵐ, N 34° 46′ : De., 6, 8 : 28°·1 : 38″·1 : y., azure. Orange, bl., '49. Beautiful.

χ^1 (Σ 2580). XIXʰ 42·6ᵐ, N 33° 30′ : 5·1, 8·1 : 73°·4 : 25″·7 : v. y., blsh. Relatively fixed, c.p.m. Beautiful field.

OΣΣ 192. XIXʰ 42·6ᵐ, N 32° 50′ : De., 6, 8 : 202°·3 : 32″·1 : gold, or y., bl.

OΣ 386. XIXʰ 44·6ᵐ, N 36° 54′ : 7·7, 8 : 77°·5 : 1″.

OΣ 389. XIXʰ 48·7ᵐ, N 30° 52′ : 6·9, 8·8 : 183° : 12″·8.

η (β 980). XIXʰ 52·6ᵐ, N 34° 49′ : 5, 13 : 209°·6 : 7″·1, with two distant, 11·5. A curious trapezium, 10ᵐ *f*.

ψ (Σ 2605). XIXʰ 53·1ᵐ, N 52° 11′ : 5, 7·5 : 184°·6 : 3″·3 : w., ash. W., lilac, '50. Fr. 5, grnsh w., '76.

Σ 2606. XIXʰ 54·7ᵐ, N 33° 0′ : 7·5, 8·2 : 131° : 1″·2 : yw.

OΣ 393. XIXʰ 54·7ᵐ, N 44° 7′ : 7·5, 8·4 : 227°·4 : 21″·2 : rsh., bl.

Σ 2609. XIXʰ 55·0ᵐ, N 37° 49′ : 7, 8·1 : 29°·1 : 2″·4 : v. w.

Σ 2610. XIXʰ 55·4ᵐ, N 35° 15′ : 8·1, 8·6 : 298°·4 : 4″·3 : w.

Σ 2611. XIXʰ 55·8ᵐ, N 47° 5′ : 8, 8 : 26°·4 : 5″·1 : yw.

OΣ 394. XIXʰ 56·6ᵐ, N 36° 7′ : 7, 9·8 : 295°·4 : 11″ :

se dire, avec certaines modifications, aussi d'autres étoiles du même type.'

[CYGNUS]

Es., orange, bl. 24 sec. *f* 11′ *n* is a very pretty quadruple; 7 w., 10 red, 11, 11·5 bl.

Σ 2619. XIX^h 58·1^m, N 47° 59′ : 8·1, 8·1 : 244°·9 : 4″·3 : yw. h *comes* 12 m^s. OΣ another.

26 (OΣ 197). XIX^h 58·5^m, N 49° 49′ : De., 5·3, 8·5 : 146°·3 : 41″·7 : gold, or y., bl. *β* sees *comes* to 8·5 : 11 : 73°·7 : 9″.

Σ 2624. XIX^h 59·8^m, N 35° 44′ : 7·2, 7·8, 9·5 : 178°·8, 327°·4 : 2″, 42″·4 : w., w., o.

h 1470. XX^h 0·0^m, N 38° 2′ : ruddy y., contrasted grn. Se., 7, 8 : 335°·2 : 23″·8 : pale clear r., intense bl. 'Colori superbi.' A., 7·2, 9·4; B., 8, 10. Es., 7·2, 9 : 336°·1 : 28″·7, '92.

Σ 2626. XX^h 0·3^m, N 30° 15′ : 8, 8·2 : 121°·7 : 1″·2 : w.

Σ 2639. XX^h 5·6^m, N 35° 11′ : 7·7, 8·7 : 303°·5 : 5″·6 : yw., ashy w. Beautiful.

Σ 2645. XX^h 6·7^m, N 51° 23′ : 8, 8·3 : 136°·9 : 1″·5 : v. w.

Σ 2649. XX^h 8·3^m, N 31° 47′ : 7·7, 8·8 : 152°·3 : 26″·1 : yw., ashy.

β 430. XX^h 8·5^m, N 35° 32′ : De., 9·5, 10, 9·7 : 17°·7, 51°·3 : 1″·1, 16″·9.

o (Σ I 50). XX^h 10·5^m, N 46° 26′ : 3·7, 5, 6·5 : 323°·7, 174° : 337″·8, 106″·8 : v. y., 2 blue. Sm. found the smaller stars cerul. bl. when the larger one was concealed; Σ also called them bl. 'insignes,' '36. But I have noted 5, w., $3\frac{7}{10}$-in., '50; w., or ysh., 'with an eye of bl.,' $5\frac{1}{2}$-in., '65; 'pale y. with a cast of bl., a strange but accurate description;' same cols., $9\frac{1}{3}$-in. silver, '67, '69; Sa., same cols. (see T Cor.). There is a 16 m^s. (Sm.), *β* 321°·7 : 36″·8 : a light test. Fr. holds it with 5-in. achr.; Sa., easy $6\frac{1}{2}$-in. spec. *β* adds a fainter one, 169°·6 : 43″·2, nearly between

3·7 and 6·5, and sees 3 others to 6·5, all easy, and detected independently by Es., 17½-in.

Σ 2658. xx^h $11·0^m$, N 52° 49′ : 7, 9·1, 10·2 : 126°·9, 216°·8 : 5″·5, 32″·1 : yw., bl., o.

Σ 2663. xx^h $13·2^m$, N 39° 24′ : 8, 8·5 : 324°·9 : 5″·3 : w.

β 441. xx^h $13·4^m$, N 28° 50′ : De., 6·2, 11·5 : 67°·6 : 5″·7.

β 661. xx^h $13·4^m$, N 40° 3′ : 6·2, 12·5 : 67° : 12″·6.

Σ 2667. xx^h $14·3^m$, N 45° 20′ : 8·2, 8·5 : 225°·7 : 8″·1 : v. w.

Σ 2666. xx^h $14·6^m$, N 40° 25′ : 6·5, 8·7 : 242° : 2″·7 : v. w., blsh.

Σ 2671. xx^h $16·0^m$, N 55° 5′ : 6, 7·4 : 341°·1 : 3″ : w., ash. Fr., tawny, '76. A pretty pair.

Σ 2668. xx^h $16·6^m$, N 39° 5′ : 7, 9·2 : 293°·6 : 3″·3 : yw., ash.

β 663. xx^h $17·9^m$, N 53° 17′ : 6·3, 15·2, 12·5 : 313°·6, 75°·2 : 6″·6, 7″·7.

γ Cygni. xx^h $18·6^m$, N 39° 56′ : 3 m^g. β sees the distant *comes* (196° : 141″), double 10·4, 10·4 : 302°·0 : 1″·8. Pickering finds from photographs several bright and dark lines in spectrum of γ. 12′ *n*, 23 sec. *p*, Es. sees a Red III Type star unsteady in light. There is a brilliant field *f*, and splendid sweeping *s*, especially between 36°, 37°, in the neighbourhood of 28, 29, 36, all 5 m^g.

Σ 2693. xx^h $25·8^m$, N 54° 10′ : 8, 9 : 13°·7 : 13″·6 : w.

Σ 2691. xx^h $26·0^m$, N 37° 48′ : 8, 8·2 : 32°·8 : 17″·1 : w. A fine pair.

ω^3 (*Hh.* 694). xx^h $28·2^m$, N 48° 53′ : β 5½, 10 : 86°·3 : 56″·3. β sees minute *comes*, 13·5 : 342°·5 : 17″·3. *Hh.* 693 (Σ 6·5, 8·5), w., bl., '50; Sa., bl., mauve; *p*, makes with it a fine group. Two stars, which my $3\frac{7}{10}$-in. would just

reach, but which are said to have been seen with 3-in. form a trapezium with ω^3. ω^3, deep y., '50.

β 434. xx^h $28{\cdot}8^m$, N 41° 31′ : De., 9·1, 9·8 : 101°·1 : 1″·4.

Triplet, ±. xx^h 30^m, N 29° 19′.

Σ 2700. xx^h $30{\cdot}7^m$, N 32° 9′ : 6·5, 8·3 : 286°·2 : 24″ : y., v. bl. Two wide pairs *f*.

Σ 2702. xx^h $31{\cdot}7^m$, N 34° 49′ : 8·5, 8·7 : 205°·8 : 3″·3 : w.

48 (Σ I 53). xx^h $33{\cdot}4^m$, N 31° 13′ : 6, 6·1 : 174°·8 : 178″·1 : w., yw. 8, 8·25, w., '77. In splendid region. 20′ and 30′ *n* of 48 are two similar but smaller pairs. The student will meet with many inexplicable arrangements of this character in crowded fields.

Σ 2705. xx^h $33{\cdot}7^m$, N 33° 1′ : 7·1, 8·1 : 262°·1 : 3″ : y., bl.

Σ 2707. xx^h $34{\cdot}6^m$, N 47° 35′ : 7·1, 7·9, 8·6 : 196° : 31°·7 : 55″·4, 23″ : w.

Σ 2708. xx^h $34{\cdot}9^m$, N 38° 17′ : 7, 8·7 : 351°·7 : 11″·3 : y., bl., '32. Ha., 331°·9 : 24″·5, '87, with *comes* 15 : 40° : 15″. 8, 9, '79. Fr., scarcely 1 m^s. diff., '76.

Σ 2711. xx^h $35{\cdot}5^m$, N 30° 9′ : 8, 9 : 222°·5 : 2″·5 : w.

OΣ 410. xx^h $35{\cdot}9^m$, N 40° 13′ : 6·4, 6·7, 7·7 : 31°·2, 69°·8 : 0″·7, 69″. Two very y., gold. Perr., AB., 17°·6 : 0″·8, '83.

49 (Σ 2716). xx^h $37{\cdot}0^m$, N 31° 57′ : 6, 8·1 : 49°·4 : 2″·7 : y., bl. 2° *sp* ϵ.

51 (β 675). xx^h $39{\cdot}1^m$, N 49° 59′ : 6, 12·5 : 101°·5 : 2″·8. Two other *comites*, 26″, 33″.

52 (Σ 2726). xx^h $41{\cdot}6^m$, N 30° 21′ : 4, 9·2 : 57°·2 : 6″·6 : v. y., o. Y., bl., '50. 3° *s* of ϵ, 4^m 55^s *f*, 10′ *n* of 52 is β 67, De., 6·9, 10·2 : 287°·1 : 1″·5.

[CYGNUS]

λ (OΣ 413). xx^h 43·5, N 36° 8′ : 5, 6·3 : 82°·1 : 0″·7 : w., o. Ha., 73°·6 : 0″·7, '87. Bin. Per., 93·4 yrs. Glasenapp.

OΣ 414. xx^h 43·5^m, N 42° 3′ : 7·2, 8·3 : 95°·9 : 9″·9.

Triple. xx^h 45·2^m, N 32° 51′ : 8·7, 9, 10 : 245°·6, 141°·1 : 9″·6, 17″·9. Very red, two bl. Es.

Σ 2732. xx^h 45·7^m, N 51° 32′ : 6·7, 8·7 : 73°·8 : 4″ : w., o.

OΣ 416. xx^h 48·4^m, N 43° 22′ : 7·8, 8·1 : 141°·3 : 7″·3.

OΣ 418. xx^h 50·7^m, N 32° 19′ : 7·3, 7·4 : 293° : 1″ : rsh. w.

β 1137. xx^h 53·3^m, N 50° 20′ : 6, 13·7 : 344°·3 : 6″·9.

Σ 2741. xx^h 55·3^m, N 50° 4′ : 6, 7·3 : 35°·8 : 1″·9 : w.

59 (Σ 2743). xx^h 56·4^m, N 47° 8′ : 4·7, 9 : 352°·4 : 20″·2 : grnsh. w., bl. h., *comes* 13 : β 140°·6 : 26″·7. Es. another, 13·5 : 224°·2 : 37″·1.

60 (OΣ 426). xx^h 57·6^m, N 45° 46′ : 5·8, 10 : 166°·1 : 2″·7.

Σ 2747. xx^h 58·4^m, N 37° 16′ : 8·2, 8·2 : 257°·4 : 4″·5 : w.

Σ 2748 rej. xx^h 58·5^m, N 39° 6′ : β 6, 10 : 299°·9 : 18″·7 ; a 12 : 250° : 25″·8. Wa., several *comites*. Orango, bl., '50.

61 (Σ 2758). xxi^h 2·1^m, N 38° 13′ : 5·3, 5·9 : 89°·4 : 15″·3 : y. or gold, '28. K., 111°·7 : 18″·8, '66. Ha., 122° : 21″·2. Closely *s* 61 is a purple star 10·5 m^s. One of the most interesting objects in the sky. These suns were the first of the host of heaven to reveal to Bessel ('38) the secret of their distance.[1] This is probably 366,400

[1] Bessel's grand result was obtained with the Königsberg Heliometer. The instrument, absurdly so termed, as if it were intended to measure the *Sun*, has an object glass cut into two halves; a slight displacement of these by producing a double image, affords the means of accurate measurement. There is a fine heliometer at Oxford, 7½-in. aperture.

times that of the Earth from the Sun—itself 92,400,000 miles—a space so vast that light, which reaches from the Sun in 8^m, employs nearly 6 years to traverse it: we see these stars, therefore, not as they are now—for of their present existence we have no information—but as they were 6 years ago.[1] β has shown that the motion of the two stars is rectilinear, one having an annual motion of $5''{\cdot}196$ towards $51°{\cdot}5$, the other of $5''{\cdot}113$ towards $53°{\cdot}5$.

How vast must be the dimensions of this great Universe! What a temple for the Creator's glory! 'All the whole heavens are the Lord's,' those heavens are crowded with millions upon millions of stars; and of all that countless multitude, millions, probably, for one, are at a distance incalculably exceeding that of 61 Cygni!

Σ 2760. $21^h\ 2{\cdot}7^m$, N 33° 43′ : 7·3, 8·1 : 223°·3 : 13″·3 : ysh. w., ashy. Ha. 255°·3 : 7″·9 : '85.

Σ 2762. $21^h\ 4{\cdot}4^m$, N 29° 48′ : 6, 8 : 315°·6 : 3″·5 : grnsh. w., blsh. Yw., ruddy, '50. De., 312°·9, '70, with *comes*, 9·2 : 225°·1 : 57″·7. Also another, Fr., 35′. $1\frac{1}{2}°$ *p* ζ.

Σ 2773. $21^h\ 6{\cdot}6^m$, N 43° 35′ : 8·2, 9 : 118°·4 : 3″·3 : v. w. *β comes* 13 : 63°·5 : 22″·1. h., pair, 10 *sec. p.* β doubles the *comes*.

OΣ 431. $21^h\ 7{\cdot}7^m$, N 40° 52′ : 7·6, 8 : 117°·3 : 3″·2.

Σ 2779. $21^h\ 10{\cdot}1^m$, N 28° 40′ : 8·5, 8·5 : 189°·4 : 19″·2 : ysh. Ha., 182°·1 : 17″·6, '88.

[1] From the successive transmission of light results the extraordinary fact that the aspect of the whole heavens is of unequal date, each star having its own time of 'light-passage' to our eyes, and those times immensely differing, so that there is no impossibility in Humboldt's magnificent assertion, 'much has long ceased to exist before the knowledge of its presence reaches us; much has been otherwise arranged.' As Huggins remarks, the outburst of T Coronæ may have occurred many years ago.

[CYGNUS]

OΣ 432. xxi^h 10·5^m, N 40° 44′ : 6·8, 7·2 : 130°·4 : 1″·2 : gold.

τ (A. G. C.). xxi^h 10·8^m, N 37° 36′ : De., 4·5, 7·5 : 174°·8 : 1″·1 : wy. azure. β single, '88. 12°·4 : 0″·6, '91. Rapid Bin. Per., 53·87 yrs. Gore. Holden, *comes*, 260°·3 : 15″·7. β 245°·4 : 19″·8, '90, from proper motion.

υ (h. 932) xxi^h 13·8^m, N 34° 28′ : OΣ 4·6, 10·2, 10·2 : 219°·5 : 177°·8 : 14″·8 : 21″·4.

OΣ 437. xxi^h 16·6^m, N 32° 1′ : 6·5, 7·2 : 57°·8 : 1″·5 : y., o. Ha., 47°·2, '88.

Σ 2789. xxi^h 16·8^m, N 52° 33′ : 7·1, 7·1 : 116°·4 : 5″·9 : w., ysh.

Σ 2803. xxi^h 26·5^m, N 52° 29′ : 7·4, 9 : 290°·2 : 23″·2 : v. w., o.

Σ 2802. xxi^h 27·6^m, N 33° 22′ : 8, 8 : 11°·3 : 3″·8 : w.

OΣ 447. xxi^h 35·6^m, N 41° 16′ : 7, 7·9, 11·1 : 45°·3, 169°·4 : 29″, 14″ : y., ysh. o. 2 *comites* smaller and nearer.

75 (A. C. 20). xxi^h 36·2^m, N 42° 49′ : De., 5·2, 10·5 : 322°·3 : 2″·7.

μ (Σ 2822). xxi^h 39·6^m, N 28° 18′ : 4, 5 : 114°·5 : 5″·6 : w., blsh. w. Ha., 121°·3 : 3″·2, '89. There is a 7, De., 56°·3 : 209″·7. Y., tawny or bl., lilac, '51. Cols. should be watched; observers differ. Fr., several minute stars with 5-in. achr. between 7 and close pair. So Fl. Σ c.p.m. in close pair, which is Bin.

Σ 2832. xxi^h 45·6^m, N 50° 3′ : 7·8, 8·3 : 213°·6 : 13″·1 : v. w.

OΣ 456. xxi^h 51·9^m, N 52° 5′ : 7·8, 8 : 25°·7 : 1″·3.

Σ 2852. xxi^h 57·0^m, N 53° 41′ : 9, 9 : 171°·9 : 7″·7 : w.

Stars with Remarkable Spectra and Variables.

Es-Birm. 600. XIX^{h} $21{\cdot}9^{m}$, N 50° $2'$: 7·5 : R. : III. Es.

Es-Birm. 608. XIX^{h} $25{\cdot}8^{m}$, N 45° $50'$: 8·6 : var. : VR. : IV. Es.

R (var.). XIX^{h} $34{\cdot}1^{m}$, N 49° $58'$: 5·9–8 below 14 : Per., $425{\cdot}7^{d}$. Pogson. *F* bright. Es.

Es-Birm. 616. XIX^{h} $37{\cdot}1^{m}$, N 32° $23'$: 8 : VR. : B. IV. Du.

RT (var.). XIX^{h} $40{\cdot}8^{m}$, N 48° $32'$: 7 ? 11 ? Unknown. At Harvard.

χ^{2} (var.). XIX^{h} $46{\cdot}7^{m}$, N 32° $40'$: 4–6·5 to 13·5. Per., 406^{d}. Kirch.

Es-Birm. 634. XIX^{h} $54{\cdot}0^{m}$, N 43° $59'$: 8·2 : R. : W. IV. Du. Var. Es.

Z (var.). XIX^{h} $58{\cdot}6^{m}$, N 49° $46'$: 7.1–8·5 to 11·5–12. Per., 265^{d}. Es.

Type V. XX^{h} $2{\cdot}2^{m}$, N 35° $23'$: 7·5. At Harvard.

S (var.). XX^{h} $3{\cdot}4^{m}$, N 57° $42'$: 8·8–11·3 below 14·5. Per., $322{\cdot}8^{d}$. At Bonn.

Es-Birm. 650. XX^{h} $6{\cdot}4^{m}$, N 47° $33'$: 9·3 : R. : B. Du. IV. var. Es.

Type V. XX^{h} $6{\cdot}5^{m}$, N 35° $53'$: 8·5. Wolf and Rayet.

Es-Birm. 651. XX^{h} $6{\cdot}6^{m}$, N 35° $39'$: 9·5 : VR. : IV. Pickering.

Type V. XX^{h} $8{\cdot}1^{m}$, N 35° $54'$: 8. Wolf and Rayet.

Type V. XX^{h} $8{\cdot}5^{m}$, N 38° $4'$: 7·1. Copeland.

RS (var.). XX^{h} $9{\cdot}8^{m}$, N 38° $26'$: 6·8 to 8·3–10 : Irreg. Es. IV.

Type V. XX^{h} $10{\cdot}8^{m}$, N 36° $21'$: 8. Wolf and Rayet. 3rd of a beautiful bright semicircle; an orange *n*.

Es-Birm. 659*a*. XX^{h} $13{\cdot}2^{m}$ N 49° $38'$: 9–10 var. : IV. R. : Es.

[CYGNUS]

Type V. xx^h $13{\cdot}3^m$, N 37° 7′ : 8·1. At Harvard.

P (var.). xx^h $14{\cdot}1^m$, N 37° 43′ : 3–5 below 6 : Jansen Pickering finds bright and dark lines.

Es-Birm. 662*a*. xx^h $14{\cdot}8^m$, N 37° 5′ : 9·5 : R. : IV. Es.

Type V. xx^h $15{\cdot}9^m$, N 38° 25′ : 8·7. At Harvard.

U (var.). xx^h $16{\cdot}5^m$, N 47° 35′ : 7–8·1 to 9·4–11·6 : Per., $463{\cdot}5^d$. Knott. Type IV. See under 32 *infra*.

Type V. xx^h $17{\cdot}0^m$, N 43° 32′ : 7·5. At Harvard.

Es. 458. xx^h $17{\cdot}4^m$, N 35° 18′ : 9·5. IV. Es.

Es-Birm. 664. xx^h $17{\cdot}6^m$, N 36° 37′ : 9·5 : R. : W. : IV Es.

Type V. xx^h $17{\cdot}8^m$, N 36° 36′ : 9·5. At Harvard.

Es-Birm. 665. xx^h $17{\cdot}9^m$, N 37° 13′ : 9·4 : IV. Es.

Es-Birm. 673. (var.). xx^h $25{\cdot}2^m$, N 39° 39′ : 7·9–9. Unknown : IV. Es.

V (var.). xx^h $38{\cdot}1^m$, N 47° 47′ : 6·8–9·5 to 13·5 : Per., 418^d. B. IV. type.

X (var.). xx^h $39{\cdot}5^m$, N 35° 14′ : 6·4 to 7·2–7·7 : Per., $16{\cdot}389^d$. Chandler.

RR (var.). xx^h $42{\cdot}6^m$, N 44° 30′ : 8·1–8·7 to 9·3–9·7. Unknown. III. Es.

T (var.). xx^h $43{\cdot}2^m$, N 34° 0′ : 5·5 ? to 6? irregular. Schmidt. β two *comites*.

Es-Birm. 688. xx^h $43{\cdot}5^m$, N 45° 41′ : 8·8 : R. : IV ? Es.

Y (var.). xx^h $48{\cdot}1^m$, N 34° 17′ : 7·1 to 7·9. Per., 1^d 11^h 57^m 22^s. Algol type. Chandler.

v. xxi^h $13{\cdot}8^m$, N 34° 28′ : 4·4 : *F* bright. At Harvard.

Es-Birm. 705. xxi^h $18{\cdot}6^m$, N 41° 58′ : 9·5 : R. : Lassel. IV. Du.

W (var.). xxi^h $32{\cdot}2^m$, N 44° 56′ : 5·0–6·3 to 6·1–6·7. Per., $130{\cdot}8^d$. Gore.

[CYGNUS]

RU (var.). $xxi^h\ 37{\cdot}3^m$, N 53° 52′ : 7·6 to 9·1. Unknown Es.

Nova. $xxi^h\ 37{\cdot}8^m$, N 42° 23′. Appeared suddenly 3 m^s. Nov. 24, '76, and has faded irregularly to 14 m^s. The spectrum which showed the bright lines of incandescence changed to that of a monochromatic neb., and afterwards became continuous.

Es-Birm. 711. $xxi^h\ 37{\cdot}8^m$, N 35° 3′ : 6·2 : R. : IV. D'A.

RV (var.). $xxi^h\ 39{\cdot}1^m$ N 37° 34′ : 7·1–7·8 to 8·8–9·3. Irreg. Yendell. IV Type.

Clusters and Nebulæ.

6866 (H. VII. 59). $xx^h\ 0{\cdot}5^m$, N 43° 43′. Fine cl.

Glorious, sweeping along, 35° 30′ culminating about 27 : $xx^h\ 2{\cdot}2^m$, N 35° 31′ Fr., fine trapezium $\frac{1}{4}°$ *s* of 27 : brightest beautiful double.

32. $xx^h\ 12{\cdot}3^m$, N 47° 24′ : 5 : dull or. Marks a fine field. $4{\cdot}2^m$ *f* 11′ *n* is U Cygni with 8·0 *comes* blue, B. (Es., yw., 52°·3 : 62″·7. $1^m\ 51^s$ *p* 14′ *s* is a pretty pair, h. 1510 : 9·7, 10 : 334°·2 : 5″.)

6910 (H. VIII 56). $xx^h\ 19{\cdot}5^m$, N 40° 27′. Beautiful group. h., 10–12. $\frac{1}{2}°$ *n* of γ, a little *f*.

6940 (H. VII 8). $xx^h\ 30{\cdot}4^m$, N 27° 58′. Field of minute stars.

6960 (H. V 15). $xx^h\ 41{\cdot}5^m$, N 30° 21′. Nebulous ray extending *n* and *s* of 52.

6992 (H. V 14). $xx^h\ 52{\cdot}2^m$, N 31° 19′. Large nebulosity in a curve. Wolf's photos show that this and 6960 are probably one large nebula.

ξ. $xxi^h\ 1{\cdot}3^m$, N 43° 32′. Great neb. found by Wolf on photos; sharply defined *s*, and containing a dark opening like

a cross. Visible as a glow in a field glass, but brightest part scarcely visible in 17¼-in. reflector. Es.

7027 (Stephan.) XXI^h 3·3^m, N 41° 50′. Planetary, like an 8·5 star about 4″, found by me independently, Nov. 14, '79.

Curious horseshoe, and magnificent Galaxy field. XXI^h 4·8^m, N 46° 51′. Es.

I had at one time projected a survey of the wonders of this region with a sweeping power; but want of leisure, an unsuitable mounting, and the astonishing profusion of magnificence, combined to render a task hopeless for me which, I trust, may be carried through by some future observer.

DELPHINUS.

The leaders of this little, compact, fish-like constellation, α and β, are distinguished by names which, even among the multifarious disfigurements of Oriental words, so abundant in the heavens, are pre-eminently strange—*Svalocin* and *Rotanev*. The former Sm. has justly characterized as 'cacophonous and barbaric,' and says that 'no poring into the black-letter versions of the Almagest, El Battáni, Ibn Yúnis, and other authorities, enables one to form any rational conjecture as to the misreading, miswriting, or misapplication, in which so strange a metamorphosis could have originated.' And of *Rotanev* he observes, 'That which putteth derivation and etymology at defiance.' Where so eminent and accomplished a scholar and antiquarian did not succeed it would seem presumptuous to offer a solution, but that accident is sometimes more fortunate than study; and if the following is not after all the right key, it certainly is a marvel that it should open the lock so readily. The

letters of these strange words reversed form NICOLAVS VENATOR, a Latin version of the name of NICCOLO CACCIATORE, assistant at the Palermo Observatory, in the catalogue emanating from which these stars are so denominated.[1] A very fine region for sweeping.

Double Stars.

Σ 2665. xx^h $14{\cdot}7^m$, N 14° 4′ : 6·5, 9·2 : 17°·2 : 3″·1 : w., o.

Σ 2664. xx^h $14{\cdot}9^m$, N 12° 42′ : 7·7, 8·2 : 322°·6 : 27″·7 : w.

Σ 2680. xx^h $20{\cdot}2^m$, N 14° 32′ : 8·3, 8·5 : 289° : 15″·8 : w.

1 (β 63). xx^h $25{\cdot}5^m$, N 10° 34′ : De., 6, 8·1 : 343°·3 : o″·8. Maw, 353°·6 : 1″·1, '91. Triple. Washington ach. est., 360° : 15″.

15 (Σ 2690). xx^h $26{\cdot}4^m$, N 10° 56′ : 7, 7·2 : 256°·3 : 14″·2 : w. Ha., 15″·4, '84. A 9 m^g. which D. discovered, '40, as an elongation of 8, and a 16 m^g, β, 108°·5 : 23″·6, '77, make up a difficult quadruple group. Sm., 16 by evanescent glimpses, '35. Buffham, steady, 6½-in. 'With' spec., '68.

Σ 2696. xx^h $28{\cdot}6^m$, N 5° 6 : 8, 8·4 : 298°·9 : 1″·1 : w. β *comes*, 12.

Σ 2703. xx^h $32{\cdot}2^m$, N 14° 23′ : 7·6, 7·6, 7·6 : 291°·2 239°·4 : 25″·1 : 66″·7 : w., ysh. : w.

β (β 151) xx^h $32{\cdot}8^m$, N 14° 15′ : 4, 6 : Rapid bin. Per., 26 yrs. (Doubjago). Ha., single, '86; 330°·1 : o″·4, '91. Two distant *comites*. β and ζ, two fine y. stars.

θ. xx^h $34{\cdot}0^m$, N 13° o′. Is in a beautiful field.

κ (OΣ 533). xx^h $34{\cdot}3^m$, N 9° 44′ : 4·7, 11·3 : 13°·3 : 10″·3. Ha., 318°·7 : 12″·1, '84.

[1] Cacciatore died in 1841, from the effects of cholera.

[DELPHINUS]

β 288. xx^h 34·4^m, N 15° 29′ : 6·2, 13·2 : 162° : 7″·7.

a. xx^h 35·0^m, N 15° 33′, and P. XX 247, form a fine combination : pale y., pale lilac. β and Sa., several minute *comites*.

Σ 2713. xx^h 36·1^m, N 10° 13′ : 9, 9 : 64°·1 : 4″·8 : w.

Σ 2718. xx^h 37·8^m, N 12° 23′ : 7·4, 7·6 : 86°·6 : 8″·3 : w.

Σ 2720. xx^h 38·9^m, N 16° 35′ : 8·5, 8·7 : 185° : 3″·8 : w.

Σ 2722. xx^h 39·1^m, N 19° 22′ : 8·2, 8·7 : 308° : 7″·1 : yw., ash.

Σ 2723. xx^h 40·2^m, N 11° 57′ : 6·4, 8·2 : 85°·6 : 1″·5 : w. Ha., 95°·8 : 1″·2, '87. β, 12 *comes*.

Σ 2725. xx^h 41·6^m, N 15° 32′ : 7·3, 8 : 358° : 4″·2 : w., ashy. Maw, 2°·3 : 4″·9, '89. Fr., y., bl., '76.

γ (Σ 2727). xx^h 42·0^m, N 15° 46′ : 4, 5 : 273°·8 : 11″·9 : gold, blsh. green. Ha., 270°·6 : 11″·2, '89. Extremely slow motion. Y., pale grn., '55, '57. H., w., 1779. Hence Σ suspects change. h. and S., w., ysh., '24. Gore, redsh. y., greysh. lilac, '74. C.p.m.

13 (β 65). xx^h 42·8^m, N 5° 38′ : De., 5·2, 8·9 : 186°·8 : 1″·6 : w., olive.

Σ 2730. xx^h 46·1^m, N 6° 0′ : 7·8, 7·9 : 339°·2 : 3″·4 : yw. Pretty pair.

Σ 2734. xx^h 49·3^m, N 12° 43′ : 8·2, 8·7 : 181°·7 : 28″·5 : w. Distance diminishing.

Σ 2736. xx^h 52·0^m, N 12° 37′ : 7·5, 8·7 : 218°·5 : 5″·1 : w.

Σ 2738. xx^h 53·9^m, N 16° 3′ : 7·2, 8·2 : 254°·4 : 14″·7 : w., o.

Σ 2739. xx^h 55·3^m, N 19° 41′ : 8·3, 8·8 : 252°·1 : 3″·2 : w.

Σ 2754. xxi^h 1·4^m, N 12° 46′ : 8, 8·7 : 303°·2 : 34″·6 : w.

[DELPHINUS]

Stars with Remarkable Spectra and Variables.

R (var.). xx^h $10{\cdot}1^m$, N 8° 47′ : 7·6–9 to 11·1–12·8. Per., $285{\cdot}5^d$. Hencke and Schönfeld.

Es-Birm. 672. xx^h $24{\cdot}6^m$, N 15° 56′ : 8·3 : R. Webb, blue near. III. Vogel.

Es-Birm. 679. xx^h $33{\cdot}4^m$, N 17° 55′ : 7 : yr. : III : D'A.

S (var.). xx^h $38{\cdot}5^m$, N 16° 44′ : 8·4–9·5 to 10·4–12. Per., $277{\cdot}5^d$. Baxendell, an 8·5 near, same colour.

T (var.). xx^h $40{\cdot}7^m$, N 16° 2′ : 8·2–10·3 below 13. Per., $331{\cdot}9^d$. Baxendell.

U (var.). xx^h $40{\cdot}9^m$, N 17° 44′ : 6·4–7·3. Irreg.? D'A. Fine III type. A 9 m^s. 18 sec. *p*, 10′ *n*, same col. Es.

Nebulæ.

6905 (H. IV 16). xx^h $17{\cdot}9^m$, N 19° 47′. Small, faint, misty, ill-defined, closely surrounded by several small stars. E. of R., spiral.

6934 (H. I 103). xx^h $29{\cdot}3^m$, N 7° 4′. H., bright, large, resolved, 16–20 m^g. D'A., easy.

DRACO.

A long, winding constellation, always above the horizon; in consequence of which its stars, like all others in the Arctic Circle, appear at different times *entirely reversed* in relative position. A careful attention to *p* and *f*, that is, to the direction of apparent motion through the field, is in these cases required, to ensure identification. Here are many fine pairs.

Double Stars.

Σ 1304. $11^h\ 6{\cdot}6^m$, N 81° 49′ : 8·2, 9 : 317° : 24″·1 : yw. o.

Σ 1326. $11^h\ 14{\cdot}4^m$, N 78° 53′ : 7·7, 8·1 : 171°·4 : 29″ : w.

Σ 1516. $11^h\ 8{\cdot}8^m$, N 74° 1′ : 7, 7·5 : 298°·7 : 9″·9 : ysh., ashy y., '31. Ha., 96°·8 : 15″·4, '91. From p.m. 3rd (OΣ 539), Du.'s *min. visib.* $9\frac{6}{10}$-in. : 299°·4 : 7″·5. C.p.m. with 7.

Σ 1573. $11^h\ 43{\cdot}8^m$, N 67° 53′ : 6·6, 7·6 : 177°·9 : 11″·1 : w.

β 794. $11^h\ 48{\cdot}3^m$, N 74° 19 : 6·5, 7·8 : 106°·6 : 0″·4, '81. 126°·9, '90. Bin. *Comites*, 13·7 : 71°·8 : 5″·7; 13 : 78°·6 : 26″·7.

Σ 1588. $11^h\ 57{\cdot}0^m$, N 72° 56′ : 8·5, 8·7 : 60°·7 : 16″·5 : w. Ha., 54°·4 : 14″·7, '89.

Σ 1602. $12^h\ 2{\cdot}9^m$, N 69° 38′ : 7·5, 9 : 179°·8 : 13″ : w., o. $1^m\ 5^s$ *p*, 24′ *s* is Σ 3123 : 7, 7 : 289°·7 : 0″·3, '32. β, 221°·9, '81. Bin.?

Σ 1654. $12^h\ 28{\cdot}1^m$, N 75° 22′ : 7·3, 8·8 : 26° : 3″·7 : y., bl.

Σ 1698. $12^h\ 51{\cdot}6^m$, N 75° 11′ : 8·2, 8·7 : 109°·5 : 10″·3 : w.

OΣΣ 123. $13^h\ 23{\cdot}8^m$, N 65° 15′ : De., 6·4, 6·8 : 147°·1 : 68″·9 : w., yw. Ysh., bl. A striking object.

Σ 1767. $13^h\ 31{\cdot}2^m$, N 68° 15′ : 8, 8·5 : 353°·8 : 4″·7 : w.

Σ 1827. $14^h\ 11{\cdot}1^m$, N 59° 41′ : 8·5, 9 : 210°·9 : 11″·2 : w.

Σ 1831. $14^h\ 12{\cdot}9^m$, N 57° 10′ : 6·3, 9 : 142°·8 : 6″ : v. w., ash. *p* is Σ 1830 : 8·5, 9·8 : 264° : 4″·8 : ysh., o. Ha., 287°·1 : 6″·1, '85.

Σ 1860. $14^h\ 30{\cdot}8^m$, N 55° 40′ : 7·5, 8·7 : 101°·2 : 1″·2 : v. w., ashy w.

Σ 1872. $14^h\ 38{\cdot}1^m$, N 58° 23′ : 7, 8 : 38°·4 : 7″·5 : ysh., ashy w.

[DRACO]

Σ 1882. XIV^h 41·6^m, N 61° 31′ : 7·2, 8·7 : 2°·5 : 11″·5 : yw., ash.

Σ 1927. XV^h 9·9^m, N 62° 13′ : 7·1, 8 : 353°·9 : 16″·1 : w.

Σ 1948. XV^h 23·9^m, N 55° 14′ : 8, 8·7 : 50°·5 : 12″·2 : w.

Σ 1969. XV^h 39·4^m, N 60° 17′ : 8, 8·7 : 43°·4 : 1″·5 : yw.

Σ 1976. XV^h 42·9^m, N 59° 45′ : 8·2, 8·2 : 71°·8 : 18″·8 : w.

β 946. XV^h 45·2^m, N 55° 41′ : 5·2, 10·9 : 152°·0 : 1″·3.

Σ 1984. XV^h 48·5^m, N 53° 12′ : 6·2, 8·5 : 273°·8 : 6″·6 : w. o., '30.

Σ 1996. XV^h 53·9^m, N 57° 35′ : 8·7, 9 : 109°·4 : 19″·2 : ysh.

Σ 2006. XV^h 58·4^m, N 59° 13′ : 7·5, 9·2, 7·7 : 204°·6, 223°·7 : 1″·6 : 43″·5. Fl., probably a ternary.

Σ 2045. XVI^h 18·9^m, N 61° 44′ : 8, 9·2 : 183°·1 : 2″·5 : yw. o.

η (OΣ 312). XVI^h 22·6^m, N 61° 44′ : 2·1, 8·1 : 143°·1 : 4″·7 : y., o. 11′ *n* is Σ 2054 : 5·7, 6·9 : 7°·4 : 0″·9 : ysh. Maw, 358°·4 : 1″·1, '89. Bin.

Σ 2060. XVI^h 26·5^m, N 56° 58′ : 9, 9 : 246°·2 : 3″·7 : o.

17 (Σ 2078). XVI^h 33·9^m, N 53° 8′ : 5, 6 : 116°·5 : 3″·7 : w., alternately var., '33. A 5 m^g. (16) 14°·7 : 90″·4. W., pale lilac, w., '50.

Σ 2116. XVI^h 54·4^m, N 63° 41′ : 8·2, 8·8 : 6° : 18″·9 : v. w.

20 (Σ 2118). XVI^h 55·9^m, N 65° 11′ : 6·4, 6·9 : 246°·4 : 0″·8 : w., '32. β 125°·6 : 0″·11, '91. Bin.

Σ 2124. XVI^h 58·9^m, N 65° 21′ : 8·5, 9·2 : 88°·9 : 15″·1 : w.

Σ 2128. XVII^h 2·0^m, N 59° 43′ : 8, 9·2 : 57°·4 : 11″·6 : ysh., o.

μ (Σ 2130). XVII^h 3·2^m, N 54° 36′ : 5·0, 5·1 : 205°·1 :

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3″·2 : w. β 159°·4 : 2″·4, '89. Bin. Per., 648·0 yrs. Berberich. Fl., both stars var.? D., 6, 6. De., 5, 5. Sm., 4, 4·5. β sees *comes* to 5·1 ; 13 m^s. 189°·7 : 12″·2.

Σ 2138. XVII^h 8·0^m, N 54° 39′ : 8, 8·3 : 139°·2 : 22″·3 : v. w.

Σ 2155. XVII^h 14·9^m, N 60° 49′ : 6·2, 9·5 : 115°·5 : 9″·6 : w., o.

Σ 2180. XVII^h 26·6^m, N 50° 56′ : 7, 7·2 : 265°·3 : 3″·2 : v. w.

β (β 1090). XVII^h 28·1^m, N 52° 23′ : 3, 14 : 13°·4 : 4″. Bin.?

ν (Σ I 35). XVII^h 30·2^m, N 55° 15′ : 4·6, 4·6 : 313° : 61″·7 : yw. A grand object. C.p.m.

26 (β 962). XVII^h 34·0^m, N 61° 57′ : 5·5, 10·1 : 151°·8 : 1″·4, '79. 125°·7 : 0″·8, '91. Rapid Bin.

Σ 2199. XVII^h 36·8^m, N 55° 48′ : 7·2, 7·8 : 116°·4 : 1″·7 : ysh. Tarrant, 95°·0, '87. Bin.

Σ 2207. XVII^h 37·2^m, N 67° 4′ : 8, 8·5 : 128°·1 : 1″·1 : w.

Σ 2218. XVII^h 39·7^m, N 63° 43′ : 6·5, 7·7 : 356°·7 : 2″·5 : w., ash. Maw. 345°·8 : 2″·1, '89. Bin.?

Σ 2219. XVII^h 40·3^m, N 61° 39′ : 8, 9 : 103°·7 : 17″·7 : y., w.

Σ 2225. XVII^h 42·4^m, N 51° 59′ : 8·9, 9·2 : 319°·4 : 9″·1 : o.

ψ^1 (Σ 2241). XVII^h 43·7^m, N 72° 12′ : 4, 5·2 : 15°·1 : 30″·9 : w., y., lilac, '50. So Fr., '76.

γ (β 633). XVII^h 54·3^m, N 51° 31′ : 2, 13·2 : 151°·9 : 20″·9.

Σ 2261. XVII^h 55·8^m, N 52° 13′ : 7·5, 9·5 : 262°·5 : 9″·2 : yw., o.

Σ 2271. XVII^h 58·0^m, N 52° 51′ : 7·3, 8·3 : 262°·3 : 1″·9 : w. Ha., 268°·2 : 2″·2 '85.

[DRACO]

Σ 2273. XVII^h 58·7^m, N 64° 9′ : 6·8, 7·3 : 284°·7 : 20″·5 : yw., blsh. w.

Σ 2278. XVIII^h 1·2^m, N 56° 26′ : 6·8, 7·3, 7·8 : 22°·5 : 38″·9. BC. : 147°·8 : 6″ : w.

Σ 2284. XVIII^h 1·3^m, N 65° 57′ : 7·6, 9·2 : 193°·7 : 3″·7 : ysh., ash.

Σ 2279. XVIII^h 2·2^m, N 50° 52′ : 8·7, 8·8 : 182°·8 : 13″ : 0.

40 (Σ 2308). XVIII^h 7·5^m, N 79° 59′ : 5·4, 6·1 : 235°·6 : 20″·6 : w. Y., paler y., $3\frac{7}{10}$-in., '56, so $5\frac{1}{2}$-in., '63 : grouped finely with a smaller lilac star.

Σ 2307. XVIII^h 12·0^m, N 69° 13′ : 8·5, 8·5 : 205°·2 : 4″·3.

φ (OΣ 353). XVIII^h 22·2^m, N 71° 17′ : 4·8, 6·5 : 60°·5 : 0″·5. Perrotin; 54°·6, '85.

39 (Σ 2323) XVIII^h 22·4^m, N 58° 45′ : 4·7, 7·7, 7·1 : 5°·9 : 21°·7 : 3″·1, 89″ : yw., blsh. w., ash. W., ruddy, lilac, '50. Ha., AB. : 358°·4 : 3″·6 : '89.

Σ 2348. XVIII^h 31·7^m, N 52° 16′ : 5·9, 8·1 : 272°·7 : 25″·7 : v. y., v. bl.

Σ 2357. XVIII^h 32·2^m, N 63° 38′ : 8·3, 9 : 270°·9 : 4″·5 : w.

Σ 2368. XVIII^h 36·6^m, N 52° 16′ : 7·2, 7·4 : 331°·3 : 2″ : ysh.

46 (H*h*. 575). XVIII^h 40·7^m, N 55° 26′ : 5, 9 : Full y., clear bl. Fine contrast.

Σ 2403. XVIII^h 43·1^m, N 60° 56′ : 6·2, 9 : 258°·7 : 1″·9 : y. bl.

β 971. XVIII^h 45·0^m, N 49° 19′ : 6·5, 8·5 : 354°·7 : 0″·5.

Σ 2410. XVIII^h 45·5^m, N 59° 13′ : 8·2, 8·7 : 97°·5 : 1″·5 : w. Elongated ? $3\frac{7}{10}$, '50. Neat pair *f*.

o (Σ 2420). XVIII^h 49·7^m, N 59° 16′ : 4·6, 7·6 : 346°·2 : 30″·3 : v. y., ash. Deep y., bl., '50. Ha., 335°·9 : 31″·4, '89.

β 1255. XVIII^h 52·1^m, N 48° 44′ : 5·8, 12·5 : 88°·0 : 1″·6.

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Σ 2452. XVIII^h 56·9^m, N 75° 39′ : 6·7, 7·5 : 219°·8 : 5″·7 : w.

Σ 2451. XIX^h 0·5^m, N 51° 26′ : 8·7, 9 : 58°·1 : 2″·6 : w.

Σ 2478. XIX^h 3·0^m, N 69° 17′ : 8·8, 8·8 : 290°·2 : 1″·3 : o.

Σ 2550. XIX^h 28·8^m, N 73° 8′ : 8·2, 8·2 : 248°·8 : 2″ : w.

Σ 2549. XIX^h 30·0^m, N 63° 5′ : 7·7, 8·9, 7·7 : 291°·3, 278°·8 : 21″·1, 47″·5 : yw., o., yw.

Σ I 44. XIX^h 32·0^m, N 59° 54′ : 5·2, 7·2 : 287°·1 : 76″·6 : gold, bl.

Σ 2553. XIX^h 32·1^m, N 61° 50′ : 8·4, 9·2 : 80°·3 : 1″·1 : o. Ha., 95°·6 : 0″·8, '89. Bird, minute *comes nf.*

Σ 2554. XIX^h 32·4^m, N 60° 3′ : 7·9, 8·4 : 197°·3 : 18″·8 : w.

Σ 2571. XIX^h 34·2^m, N 78° 2′ : 7·3, 8 : 23°·2 : 11″·3 : v. w. Angle reversed, Cincinn., '78, '79.

Σ 2573. XIX^h 38·7^m, N 60° 17′ : 6·2, 8·5 : 29°·7 : 18″·1 : w., bl.

ε (Σ 2603). XIX^h 48·5^m, N 70° 1′ : 4, 7·6 : 354°·5 : 2″·8 : y., bl. 7·6 var. Sm., 9·5. h. and South, very difficult. De., once 6, four times 7·5. Easy to me. Contrast very pleasing. Ha., 4°·4 : 3″·1, '89. Bin ?

Σ 2604. XIX^h 51·7^m, N 63° 55′ : 6·5, 8·7 : 184°·6 : 27″·8 : y., bl.

Σ 2617. XIX^h 53·5^m, N 75° 8′ : 8·5, 9 : 42° : 27″·7 : w.

Σ 2642. XX^h 4·2^m, N 63° 25′ : 8·7, 8·7 : 165°·2 : 2″·4 : yw. : 9′ *n* is Σ 2640 : 6, 9·9 : 27°·2 : 4″·9 : v. w., o. Both moving ?

Σ 2660. XX^h 10·7^m, N 64° 13′ : 8·2, 9 : 167°·6 : 22″ : w., ash.

Σ 2694. XX^h 20·2^m, N 80° 13′ : 6·5, 10·5 : 345°·9 : 3″·7.

[DRACO]

Stars with Remarkable Spectra and Variables.

κ. XII^h 29·2^m, N 70° 20′ : 3·8. Bright lines? At Harvard.

Es-Birm. 374. XII^h 52·5^m, N 66° 32′ : 7·3 : R. : IV : D'A.

Es-Birm. 420. XIV^h 56·0^m, N 66° 20′ : 4·5 : yr. : III : Se.

R (var.). XVI^h 32·4^m, 66° 58′ : 6·5–8·7 to 12–13. Per., 245·6^d. Geelmuyden.

S (var.). XVI^h 40·8^m, N 55° 7′ : 7·3 to 9·2. Per., unknown. Es., '92.

Es-Birm. 494. XVII^h 24·9^m, N 71° 57′ : 6·8 : yr. : III : Du.

Es-Birm. 607. XIX^h 25·1^m, N 76° 20′ : 6·5 : R. : A. IV : Se. Var. Es.

Nebulæ.

3147 (H. I 79). X^h 8·3^m, N 73° 54′ : D'A., nucleus.

5866 (H. I 215). XV^h 3·7^m, N 56° 9′ : H., very bright. D'A., 90″ × 30″. Not gaseous.

6543 (H. IV 37). XVII^h 58·6^m, N 66° 38′ : Plan. very curious. D'A., '*unica prope inter nebulas.*' I found very luminous disc, much like a considerable star out of focus. H., 35″ diam.; I saw but 15″ or 20″ with $3\frac{7}{10}$-in.: D'A., 23″ × 18″. Sm., pale blue. H., very small nucleus; Bird, '63, 12-in. silv. mirror, like a 10 m^s. star; D'A., 11–12 m^s., w. Huggins, gaseous spectrum; the first of these surprising discoveries, '64, Aug. 29. Nearly halfway between Polaris and γ Draconis in pole of Ecliptic. About 40′ *np* Bird finds a delicate triple star, 8·9, 9, 11·8.

EQUULEUS.

This little asterism is easily recognised by the clustering of its stars, and its bearing from Pegasus. There are some good objects, and many interesting low-powered fields.

Double Stars.

Σ 2733. xx^h $47{\cdot}8^m$, N 6° 59′ : 8, 8·3 : 145°·4 : 40″·2 : v. w.

Σ 2735. xx^h $50{\cdot}7^m$, N 4° 9′ : 6·2, 7·7 : 289°·7 : 2″·1 : v. y., ash. Elong. 80; clearly divided 144; y., purple, '51. Second star *p* ε *n*.

ε (Σ 2737). xx^h $54{\cdot}1^m$, N 3° 55′ : 5·7, 6·2, 7·1 : 294°·0, 77°·9 : 0″·3, 11″ : ysh., ysh., ashy w. Tarrant, 284°·3, 73°·7 : 1″·3, 10″·4, '87. Separated by disc of 5·5, $9\frac{1}{3}$-in. spec., '73. 13 m^s. star *n f*, '71.

λ (Σ 2742). xx^h $56{\cdot}3^m$, N 6° 47′ : 7·1, 7·1 : 224°·7 : 2″·6 : v. w. Beautiful pair. Sm., very faint star *n p*.

Σ 2744. xx^h $58{\cdot}0^m$, N 1° 8′ : 6·3, 7 : 190°·5 : 1″·5 : w. Tarrant, 169°·6, '87.

OΣ 527. xxi^h $3{\cdot}0^m$, N 4° 45′ : 6·5, 8 : 306°·6 : 0″·4. Ha., 277°·8 : 0″·3, '86.

γ (Σ I 54). xxi^h $5{\cdot}5^m$, N 9° 44′ : 4·2, 5·7 : y., w. A striking pair. K. doubles 4·2, *comes* 11, 276°·8 : 2″·1 : bl. Sa. and β *comes* 16 m^s. β, 10° : 41″·4.

Σ 2765. xxi^h $6{\cdot}2^m$, N 9° 9′ : 7·8, 8 : 85°·7 : 3″ : w.

δ (Σ 2777). xxi^h $9{\cdot}6^m$, N 9° 36′ : 4·1, 10·2 : 38°·8 : 27″·4. Tarrant, 21°·7 : 40″·4. From great proper motion of δ. 4·1 is an extremely close pair (OΣ 535), one of the most rapid bin. known : 4·5, 5 : distance never exceeds 0″·4. Per., 11·48 yrs. : Glasenapp. Followed by 3 little stars singularly arranged in a straight line.

[EQUULEUS]

19 (β 270). Between α 21^h $10{\cdot}8^m$, N 4° 50′ and δ, a 7 m^s. open pair wh. β doubles smaller 7, 10 : De., 354°·6 : 0″·6, with *comes* est. 30° : 20″.

Σ 2786. 21^h $14{\cdot}7^m$, N 9° 6′ : 7, 8·1 : 183°·6 : 2″·5 : w.

Σ 2787. 21^h $16{\cdot}7^m$, N 1° 36′ : 7, 8·3 : 19°·5 : 22″·7 : w.

β (h. 3023). 21^h $17{\cdot}9^m$, N 6° 23′ : 5, 14, 15 : β, 308°·7, 275°·9 : 67″·4, 86″·3. 14 has *comes* 15, β, 10°·4 : 6″. Of this most severe test $3\frac{7}{10}$-in. showed 14? only; 9-in. spec. 14 and 15, now the larger, '71. All easy β 6-in. achr. Sa., $6\frac{1}{2}$-in. spec. Gore glimpsed 14 and 15, 3-in. achr. β sees a fainter *comes*, 259°·6 : 31″·5.

Σ 2791. 21^h $18{\cdot}7^m$, N 3° 56′ : 8·5, 9 : 104°·4 : 2″·4 : yw.

Σ 2793. 21^h $20{\cdot}2^m$, N 8° 57′ : 7, 8·7 : 242°·2 : 26″·5 : w., o. β divides 7 into 7·6, 7·8 : 240°·2 : 0″·5.

ERIDANUS.

An asterism winding down to S. horizon, its *lucida* being out of sight in our latitudes.

Double Stars.

Σ 315. 2^h $44{\cdot}5^m$, S 10° 58′ : 7·5, 8·7 : 160°·2 : 2″·5 : yw.

ρ^2 (β 11). 2^h $57{\cdot}8^m$, S 8° 5′ : 6, 10·2 : 85°·1 : 2″·5.

β 84. 3^h $11{\cdot}0^m$, S 6° 17′ : De., 7·2, 7·4 : 10°·3 : 0″·4. β, 27°·3 : 0″·7, '90. Bin.?

β 531. 3^h $18{\cdot}4^m$, S 8° 9′ : 6·5, 11·7 : 53°·6 : 2″·9. Bin.?

Σ 408. 3^h $25{\cdot}7^m$, S 4° 37′ : 8, 8·2 : 347°·6 : 1″·4 : w. Ha., 339° : 1″·2, '88.

Σ 422. 3^h $31{\cdot}6^m$, N 0° 17′ : 6, 8·2 : 232°·2 : 6″·1 : gold, bl. Ha., 244°·2 : 6″·4, '89. C.p.m.

Σ 436. 3^h $36{\cdot}1^m$, S 12° 56′ : 7, 8·2 : 232°·4 : 30″·2 : w., o. Separating from p.m De., 33″·8, '72.

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30 (h. 338). III^h 47·7^m, S 5° 39′ : 5, 17 : β, 135°·3 : 8″·3.

32 (Σ 470). III^h 49·2^m, S 3° 14′ : 4, 6 : 347°·3 : 6″·7 : y., bl. Topaz, bright green, '50. h., 5, w., '27. Se., cols. *magnifici, superbi.* A little *np* arc Σ 466, 8·2, 10·5 : 59°·7 : 8″·1 : y., o., and Σ 468, 8·7, 9·7 : 97°·7 : 20″·1.

Σ 487. III^h 56·3^m, S 10° 46′ : 8·7, 9·2, 10·3 : 8°·7, 237°·4 : 11″·9, 21″·7 : o.

Σ 489. III^h 57·5^m, S 7° 17′ : 8·5, 8·7 : 195°·1 : 3″·3 : w.

Σ 510. IV^h 7·0^m, N 0° 28′ : 6·5, 9·5 : 300°·5 : 10″·8 : v. y., o.

39 (Σ 516). IV^h 9·6^m, S 10° 30′ : 6, 9 : 153°·9 : 6″·3 : y., bl.

o^3 (Σ 518). IV^h 10·7^m, S 7° 47′ : 4, 9·1 : 107°·5 : 85″·3 : v. y., o. Y., bl., '50. Ha., 105°·5 : 82″·1, '91. Very rapid c.p.m., 9·1 double, 10·8. OΣ, 155°·8 : 3″·9, '51. Ha., 98°·6 : 2″·6, '91. Bin. Per., 139·0 yrs., Gore. The three stars form a remarkable system. Wa., faint *comes* to 4, Σ *debilissima.* Winnecke, 185°·0 : 75″·8, '64. Ha., 84°·7 : 44″·9, '88 : is probably fixed. $3\frac{1}{2}^m$ *f* is Σ 527 : 8, 10·8 : 190°·3 : 5″·5 : w., o. 3^m *p* 37′ *n* is Σ 514 : 8·5, 10·3 : 76°·4 : 7″·7 : o.

Σ 536. IV^h 17·2^m, S 4° 54′ : 8·1, 8·7 : 152°·4 : 1″·8 : v. w. Ha., 162°·3 : 1″·6, '88.

Σ 544. IV^h 20·0^m, S 8° 59′ : 8·3, 9·2 : 356°·7 : 2″·1 ; w., o

β 403. IV^h 20·3^m, S 2° 17′ : De., 7, 8·5 : 100°·9 : 2″.

β 184. IV^h 23·6^m, S 21° 44′ : 7, 8 : 263°·9 : 1″·1.

46 (β 881). IV^h 29·0^m, S 6° 57′ : 6, 10·8 : 57° : 1″·5. 52°·7, '91. Bin.

Σ 570. IV^h 30·5^m, S 9° 57′ : 7, 8 : 258°·9 : 12″·8 : w., blsh.

Σ 571. IV^h 31·0^m, S 3° 49′ : 6·3, 11·0 : 258°·7 : 17″·8 : v. w., o.

51 (β 88). IV^h 32·6^m, S 2° 40′ : 6, 15 : 90°·1 : 32″·3.

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Σ 576. IV^h 33·4^m, S 13° 13′ : 6·7, 7·2 : 172° : 12″·3 : yw. W., grey.

55 (Σ 590). IV^h 38·8^m, S 8° 59′ : 6·2, 6·7 : 318°·3 : 9″·1 : yw. Σ, 7·2, 7·5, '20 : 6·5, 7, '22. De., 6·0, 6·3, '65. Equal, 6, Cincin., '82.

β 186. IV^h 41·2^m, S 7° 10′ : De., 8·1, 11 : 174°·1 : 2″.

β 316. IV^h 47·8^m, S 5° 27′ : De., 8·1, 8·2 : 176°·8 : 1″·2. Beautiful, in field *n* of ω.

62 (H*h*. 138). IV^h 51·4^m, S 5° 20′ : Sm., 6, 8 : 73°·6 : 63″·8 : pale w., flushed bl. Pale y., lilac, '50. 2½° *p* β (to which Sm. minute *comes*). 1^m *f* 35′ *s* is Σ 624 : 8·1, 8·6 : 88°·6 : 28″·4 : w.

Σ 636. IV^h 58·2^m, S 8° 48′ : 7·5, 8·6 : 100°·4 : 3″·7 : w.

Σ 649. V^h 3·5^m, S 8° 48′ : 7, 8·7 : 80°·8 : 21″·6 : w., bl. h., 8·7, v. ruddy.

Stars with Remarkable Spectra.

π. III^h 41·4^m, S 12° 25′ : 4·7 : III : Pickering.

γ. III^h 53·4^m, S 13° 47′ : 2·8 : III : Se.

47. IV^h 29·4^m, S 8° 26′ : 5·4 : III : D'A.

54. IV^h 36·1^m, S 19° 52′ : 4·6 : III : D'A.

Es-Birm. 117. V^m 4·9^m, S 5° 39′ : 8·7 : R. : Webb. IV, Du.

Nebulæ.

1084 (H. I 64). II^h 41·1^m, S 8° 0′ Oval, D'A., 80″ × 50″. Not gaseous.

1332 (H. I 60). III^h 21·9^m, S 21° 41′. Continuous spectrum.

1407 (H. I 107). III^h 35·7^m, S 18° 54′. Same character H. II 593, fainter *p*.

1535 (H. IV 26). IV^h 9·6^m, S 13° 0′. Plan. bright and

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round, with low powers of $3\frac{7}{10}$-in., but not bearing magnifying. La. has described it as the most interesting and extraordinary object of the kind he had ever seen; an 11 m^{s}. star standing in the centre of a circular nebula, itself placed centrally upon a larger and fainter circle of hazy light. D'A. did not see this, but thought nucl. excentric, edges resolvable, and col. light bl., as E. of Rosse, who makes nucl. granular. Huggins finds the spectrum, though, like that of several other neb., deficient at the red end, not gaseous.

GEMINI.

The leading stars are well known, but it requires a little attention to the globe or map to make out the whole constellation.

Double Stars.

Σ 830. vi^{h} 57·2^{m}, N 27° 39′ : 8·2, 8·7, 10·8 : 249°·6, 187°·7 : 12″·8, 25″·2 : ysh., o., o.

OΣ 134. vi^{h} 3·1^{m}, N 24° 27′ : 7, 8·3 : 188°·1 : 31″.

3 (β 1241). vi^{h} 3·7^{m}, N 23° 8′ : 5·9, 10 : 344°·7 : 0″·5 *Comes* 14·5 : 63°·3 : 18″·4.

4 (β 1058). vi^{h} 4·4^{m}, N 23° 1′ : 6·3, 6·4 : 104°·3 : 0″·4 Bin.?

η (β 1008). vi^{h} 8·8^{m}, N 22° 33′ : β 3, 10·5 : 301°·4 : 1″, '82 : 296°·1, '90. The principal star is var. from 3·2 to 3·7-4·2. Per., 229·1^{d}. Discovered by Schmidt. It, and also μ, have fine III Type spectra. Glorious sweeping here.

Σ 897. vi^{h} 16·2^{m}, N 26° 43′ : 8·2, 8·5 : 348°·9 : 18″·1 : w.

Σ 899. vi^{h} 17·0^{m}, N 17° 37′ : 7, 8 : 20°·3 : 2″·4 : yw., w.

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μ (S.C.C. 243). vi^h 16·9^m N 22° 34′ : Sm., 3, 11 : β 76°·6 : 73″ : crocus y., blsh. 11 much brighter than *comes* of β, marked 11½ by Sm., '49. 11 very small, 5½ in., '63; Sa., 13, '74; Fr., 13–14, '77. β finds a distant *comes* at 141° a close double.

15 (H*h*. 223). vi^h 21·8^m, N 20° 51′ : Sm., 6, 8 : 205°·4 : 33″·2 : flushed w., blsh., '32; pale w., ash, '52. To me, wsh., blsh, '49. Sestini, or., ysh., '45. K., y., purple, '72. So Sa., '75; Fr., '77.

ν (OΣΣ 77). vi^h 23·1^m, N 20° 17′ : De., 4·2, 8 : 329°·1 : 112″·6 : blsh. w., ashy y. β doubles 8, 8·7, 8·8 : 346°·2 : 0″·15, and sees a *comes* 15 m^s. to 4·2 at 358° : 22″·6, three more distant.

20 (Σ 924). vi^h 26·5^m, N 17° 51′ : 6, 6·9 : 209°·8 : 20″ : yw., blsh. w.. Y., bl., '51. Whitley, both w., '68. Sa., w., grnsh w., '75. De., both w., '73. Field fine; 1½° *np*, γ.

Σ 932. vi^h 28·7^m, N 14° 50′ : 8·2, 8·3 : 341°·7 : 2″·4 : w. Ha., 328°·6 : 2″·1, '86.

Σ 942. vi^h 31·6^m, N 23° 44′ : 9, 9·2 : 244°·1 : 3″·3 : w. Bird, corner of a parallelog. 6 sec. *f*, 28′ *s* is Σ 943 : 8·5, 9 : 165°·9 : 15″·5 : w., '29. Rapidly separating.

γ. vi^h 31·9^m, N 16° 29′ : 3 : brilliant w. with low power, minute stars radiate from it every way, Pretty field.

β 571. vi^h 34·2^m, N 13° 5′ : 6, 12 : 316°·2 : 2″·7.

ϵ (H*h*. 246). vi^h 37·8^m, N 25° 13′ : Sm., 3, 9·5 : 94°·1 : 110″·6 : brilliant w., cerul. bl., '31. 3 strong y., '49. So Sa., '74. Fr., y., '77. Fine sweeping here.

Σ 957. vi^h 38·7^m, N 30° 57′ : 7·5, 9 : 95°·6 : 3″·4 : w., ash.

Field with several pairs. vi^h 40^m, N 13° 0′.

OΣ 156. vi^h 41·5^m, N 18° 19′ : 6·5, 7 : 346°·8 : 0″·4. Ha., 306°·2 : 0″·7, '88.

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Σ 962. vi^h 41·9^m, N 26° 49′ : 8·5, 8·5 : 241°·2 : 25″·7 : w.

36 (β 1193). vi^h 44·1^m, N 21° 55′ : 5·7, 14·5 : 355° : 10″·8.

Σ 976. vi^h 45·6^m, N 18° 49′ : 8, 8·8 : 117°·6 : 35″·7 : o.

Σ 981. vi^h 49·0^m, N 30° 18′ : 8, 8 : 149°·3 : 3″·7 : w. Bird, a minute pair suspected *np*.

38 (Σ 982). vi^h 49·0^m, N 13° 19′ : 5·4, 7·7 : 174°·9 : 5″·7 : ysh., blsh. Maw, 162° : 6″·3, '90. Yw., purple, '50. Bird, grnsh. Σ, m^{ss}. var. Bin. c.p.m.

Σ 991. vi^h 51·0^m, N 25° 5′ : 8, 9 : 172°·4 : 3″·8 : v. w., blsh. Bin.?

Fine group. vi^h 53^m, N 14° 23′.

Σ 1000. vi^h 53·2^m, N 25° 22′ : 7·7, 8·7 : 66°·9 : 22″·4 : w.

ζ (OΣΣ 81). vi^h 58·2^m, N 20° 43′ : De., 4, 7·2 : 351°·6 : 93″·6 : wy., bl. Sm., 13 m^s. *comes*. β, 83°·5 : 87″·2. 13 a glimpse star, $3\frac{7}{10}$-in. Sa., very easy, $2\frac{1}{2}$-in. achr. Sa. and Wa., another *comes* 20″ from 7·2. Schm., 4 var., 3·7 to 4·5. Per., 10^d 3^h 41·5^m.

Σ 1014. vi^h 59·6^m, N 26° 17′ : 8·7, 8·7 : 32°·2 : 2″·1 : w.

Σ 1017. vii^h 1·4^m, N 17° 0′ : 8·5, 9·2 : 254° : 12″·2 : w.

Σ 1023. vii^h 2·4^m, N 25° 9′ : 8, 8·5 : 101°·8 : 24″·7 : ysh.

45 (OΣ 165). vii^h 2·7^m, N 16° 6′ : 5, 10·7 : 89°·7 : 2″·9 : gold, o. β, 53° : 3″·2, '90, from p.m.

Σ 1027. vii^h 3·0^m, N 17° 4′ : 8·1, 8·2 : 356°·2 : 6″·7 : w. Bird, yr.

τ (β 1009). vii^h 4·8^m, N 30° 25′ : 5, 11·5 : 178°·2 : 1″·9.

Σ 1035. vii^h 6·1^m, N 22° 27′ : 7·4, 7·4 : 39°·6 : 8″·5 : ysh. Very pretty.

Σ 1037. vii^h 6·6^m, N 27° 24′ : 7·1, 7·1 : 332°·7 : 1″·1 : ysh. Ha., 310°·6, '89.

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Σ 1054. VII^h 11·5^m, N 35° 8′ : 7·3, 8·5 : 291°·5 : 18″·6 : yw., blsh. w.

λ (Σ 1061). VII^h 12·4^m, N 16° 43′ : 3·2, 10·3 : 30°·9 : 9″·6 : grnsh. bl., o.

Σ 1068. VII^h 14·2^m, N 13° 34′ : 8·3, 9 : 354°·3 : 3″·9 : o.

δ (Σ 1066). VII^h 14·2^m, N 22° 10′ : 3·2, 8·2 : 196°·9 : 7″·1 : ysh., purpsh, '39. Maw, 204°·9 : 6″·8, '89. Pale y., rsh., '52. Sa. *comes* est. 180° : 85″.

Σ 1070. VII^h 14·8^m, N 34° 13′ : 8·2, 9·2 : 319°·2 : 1″·9 : w.

Σ 1081. VII^h 18·2^m, N 21° 40′ : 7·8, 8·5 : 216°·1 : 1″·3 : v. w. Bin.?

Σ 1083. VII^h 19·7^m, N 20° 42′ : 6·8, 7·8 : 42°·6 : 6″·2 : yw., blsh. w. Sa., very small star *nf*.

Σ 1088. VII^h 20·4^m, N 14° 18′ : 7, 9 : 195°·1 : 11″·1 : w. In field is Σ 1087 : 8·2, 11·5 : 41°·9 : 19″·9 : w. o.

Σ 1089. VII^h 20·5^m, N 15° 2′ : 8·5, 8·5 : 8° : 7″·2 : w. 1^m *f* 34′ *n* is Σ 1094 : 7·7, 8·7 : 96°·3 : 2″·4 : w.

Σ 1090. VII^h 20·6^m, N 18° 43′ : 7, 8, 9·5 : 97°·4, 318°·5 : 61″·1, 19″·7.

H*h*. 264. VII^h 21·7^m, N 22° 21′ : K., 7·6, 9·3 : 276°·7 : 36″ : or., bl. Cols. very fine. Es., *comes* to 7·6, 13·5 : 23°·9 : 11″·3. ± 40′ *n* of 63, 6 m^g., with 3 minute attendants, which is 2° *f* δ, a little *s*.

65 (β 1194). VII^h 23·6^m, N 28° 7′ : 5·5, 14 : 289°·5 : 13″·9.

Σ 1106. VII^h 25·6^m, N 16° 32′ : 8·7, 8·7 : 211°·2 : 10″·6 : w.

Σ 1108. VII^h 26·9^m, N 23° 7′ : 6·7, 8·5 : 179°·1 : 11″·6 : yw., blsh. Beautiful.

α (Σ 1110). VII^h 28·2^m, N 32° 7′ : 2·7, 3·7 : 262°·5 : 4″·4 : grnsh., '26. Castor. h. calls this the largest and finest of

all the double stars in our hemisphere; the certainty of its motion first fully convinced H. of the existence of binary systems. Per., 1001·2 yrs. Do. Latest measure: Ha., 229°·6 : 5″·8. There is a small star (Σ 9·5 : 162°·5 : 72″·5), which appears to belong to the system, and has been thought var. (Σ once 10 : De., 8·5, 9·5, 9 : Es., 8·6 : reddish, or purple, Oct. 25, '90. Maw 11). Excellent object for small telescopes. Huggins believes it may be receding from us about 25 miles per second; *β*, approaching us 49 miles. Nearly 1° *s*, a little *f*, is a test: OΣ 175 : 6, 6·6 : De., 332°·1 : 0″·8, '67, apparently fixed. Discovered independently by Bird with 12-in. silvered mirror, and seen by Buffham with 9-in. ditto (With); or., bl. Beautifully divided, 9½-in. spec., '78.

Σ 1124. VII^h 35·0^m, N 22° 2′ : 8·2, 8·4 : 325°·6 : 19″·4 : w. In pretty group.

Σ 1129. VII^h 35·9^m, N 18° 17′ : 8·2, 8·7 : 62°·6 : 21″·7 : w. Three minute stars *np*.

κ (OΣ 179). VII^h 38·4^m, N 24° 38′ : 4, 8·5 (var., 8·5–14?): 231°·7 : 6″·3. Very delicate and beautiful.

82 (*β* 1062). VII^h 42·6^m, N 23° 24′ : 6, 13·5 : 32°·3 : 4″·1.

Σ 1140. VII^h 42·6^m, N 18° 35′ : 6·8, 8·5 : 273°·9 : 6″·2 : y., v. bl.

Σ 1147. VII^h 44·3^m, N 24° 50′ : 9, 9 : 162°·3 : 2″·5 : w.

Stars with Remarkable Spectra and Variables.

η and *ζ* see under double stars.

Es-Birm. 172. VI^h 4·7^m, N 26° 2′ : 7·4 : R. : Schwerd : IV : D'A. Var.?

Es-Birm. 173. VI^h 5·8^m, N 21° 54′ : 7·3 : R. : B. III. Es.

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Es-Birm. 174. $6^h\ 3^m$, N 22° 56′ : 6·7 : R. : Webb. III. Es.

Es-Birm. 175. $6^h\ 7^m$, N 27° 12′ : 9 : R. : h. IV. Se.

Es-Birm. 184. $6^h\ 17^m$, N 25° 4′ : 9·5 : R. : IV : Var. Es.

Es-Birm. 187. $6^h\ 19^m$, N 14° 47′ : 6·5 : R. : Bessel. IV : Se. Var.

Es-Birm. 189. $6^h\ 20^m$, N 19° 9′ : 9·5 : R. : IV? Es.

Es. 564. $6^h\ 35^m$, N 31° 33′ : 8·1 : R. : IV. Es.

R (var.). $7^h\ 1^m$, N 22° 52′ : 6–7·8 below 13·5. Per., 370·2^d. Hind. F and other lines bright.

51. $7^h\ 7^m$, N 16° 20′ : 5·5 : III. D'A.

Es-Birm. 225. $7^h\ 14^m$, N 25° 10′ : var., 8·2–9 : IV : one of a triangle. Es.

V (var.). $7^h\ 17^m$, N 13° 17′ : 8·2–9·1 to 12–14. Per., 277^d. Baxendell.

Es-Birm. 235. $7^h\ 25^m$, N 24° 43′ : 8·2 : R. : IV. Es.

S (var.). $7^h\ 37^m$, N 23° 41′ : 8·2–8·7 below 13·5. Per., 294^d. Hind.

T (var.). $7^h\ 43^m$, N 23° 59′ : 8·1–8·7 below 13·5 Per., 288·1^d. Hind.

U (var.). $7^h\ 49^m$, N 22° 16′ : 8·9–9·7 to 13·1. Per., 36·3^d., with great irregularities. Hind. One of the most mysterious vars. Increase 1858, Nov., 1·5 m^s. per day. 1869, 3 m^m. in 24^h! White. Spectroscope shows cont. spect. Es. suspected once a large band. Probably a var. spectrum, like R Coronæ.

Clusters and Nebulæ.

2168 (M. 35). $6^h\ 7^m$, N 24° 21′. Beautiful and extensive region of small stars, a neb. to naked eye. How differently La.'s 24-in. mirror shows it, his own words will

best tell:—'A marvellously striking object. No one can see it for the first time without an exclamation. . . . The field of view, 19′ in diam. and angular subtense $53\frac{1}{2}^{c}$, is perfectly full of brilliant stars, unusually equal in magnitude, and distribution over the whole area. Nothing but a sight of the object itself can convey an adequate idea of its exquisite beauty.' Sm. observes that the stars form curves, often commencing with a larger one. There is an elegant festoon near centre, starting with a reddish star; 9-in. spec., '71. No ruddy star, Feb. 18, 21, '82. Es., pale y., '93. Between ϵ Gem. and ζ Tauri, a little *n;* in fine region. About $\frac{1}{2}^{\circ}$ *sp*, just beyond a group of outliers, is 2158 (H. VI 17), a faint dim cloud of very minute stars.

Group of eleven faint neb. VII^{h} 22·4^{m}, N 34° 1′.

2392 (H. IV 45). VII^{h} 23·3^{m}, N 21° 7′. H. observed this object as a 9 m^{g}. star 'with a pretty bright nebulosity, equally dispersed all round; a very remarkable phenomenon.' h. describes it as an 8 m^{g}. star, 'exactly in the centre' (not exactly, E. of Rosse, D'A.) 'of an exactly round bright atmosphere, 25″ in diam.' Sm., who rates it 7·5 m^{g}., says he 'could only bring it to bear as a burred star.' I was so much surprised at the result in my inferior telescope, that I cannot help supposing some temporary impediment to distinct vision at Bedford, for on coming accidentally across it in 1850 I found such a conspicuous nebulosity that I thought it was either damp on the eye lens or a telescopic comet; and in 1852 I entered it as a 'blsh. nebulosity, quite like a telescopic comet.' 1865, with 5½-in., I perceived a very faint trace of a brighter border *s* a little *f*. The E. of Rosse saw a marvellous object—a star surrounded by a small circular neb., in which, close to the star, is a little black spot. This neb. is encompassed, first by a

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dark then by a luminous ring, very bright, and always flickering; perhaps a spiral. Buffham sees the dark ring with 9-in. 'With.' Key's 18-in. mirror showed two concentric bright rings and the dark spot, '68. A mass of luminous gas. It lies 2° *sf* δ.

2420 (H. VI 1). VIIh 32·5m, N 21° 48′. Faint mass of very small stars. h., 11–18 ms. Beautiful and in rich region; 9-in. spec.

HERCULES.

Some very noteworthy telescopic objects mark this constellation; and there is a very fine sweeping in its *sf* portion. The *Ramus Pomifer* of Bayer, *Cerberus* of Hevel.

Double Stars.

β 944. XVh 26·2m, N 48° 5′ : 6·5, 12·5 : 128°·5 : 10″·7.

Σ 1956. XVh 29·7m, N 42° 9′ : 8, 9·5 : 41°·4 : 2″·7 : yw., o.

Σ 1961. XVh 31·0m, N 43° 53′ : 8·7, 9 : 56° : 21″·6 : o. De., 46°·4, '72.

Σ 1993. XVh 55·2m, N 17° 40′ : 8·2, 8·2 : 37°·7 : 34″ : w.

Σ 2000. XVh 58·4m, N 14° 16′ : 8·2, 9 : 230°·1 : 2″·5 : w.

Σ 2007. XVIh 1·4m, N 13° 35′ : 6·5, 8 : 328°·2 : 32″ : yw., w. A very fine pair.

κ^1 (Σ 2010). XVIh 3·6m, N 17° 19′ : 5, 6 : 9°·6 : 31″·2 : y. Light y., pale tawny or garnet, '50.

Σ 2015. XVIh 5·8m, N 45° 37′ : 7·7, 8·8 : 159°·3 : 2″·7 : v. w., blsh. w.

OΣ 305. XVIh 7·8m, N 33° 36′ : 5·8, 9·8 : 260°·5 : 5″·2.

Σ 2037. XVIh 14·3m, N 17° 38′ : 9, 9 : 238°·2 : 1″·6 : o., o.

τ (β 1198). XVIh 16·7m, N 46° 33′ : 4, 13·9 : 325°·3 : 6″·6.

γ (H*h*. 506). XVIh 17·5m, N 19° 23′ : De., 3·8, 8·2 : 238°·8 : 40″·5.

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23 (H*h*. 511). XVI^h 19·1^m, N 32° 34′ : Sm., 6. 9 : De., 18°·9 : 34″·9.

Σ 2047. XVI^h 20·3^m, N 47° 52′ : 7·5, 8 : 333°·2 : 2″·3 : w.

Σ 2044. XVI^h 20·6^m, N 37° 16′ : 7·8, 8 : 346°·9 : 8″·5 : w. Very pretty. Easily found from M. 13.

ω (*β* 625). XVI^h 20·8^m, N 14° 15′ : 5, 11·9 : 175°·3 : 1″·9. An 11·5 at 103°·1 : 33″·8.

Σ 2049. XVI^h 23·8^m, N 26° 12′ : 6·5, 7·5 : 215°·2 : 1″·1 : w.

Σ 2052. XVI^h 24·5^m, N 18° 37′ : 7·5, 7·5 : 109°·7 : 3″ : w. Ha., 99°·2, '84. C.p.m. Bin.

Σ 2051. XVI^h 24·7^m, N 10° 48′ : 7·1, 8·6 : 18°·9 : 13″·5 : ysh., blsh.

Σ 2056. XVI^h 26·7^m, N 5° 38′ : 7·9, 9 : 318°·1 : 6″ : w., ash.

Σ 2057. XVI^h 27·3^m, N 19° 30′ : 9, 9·2 : 264°·6 : 4″·9 : o.

Σ 2059. XVI^h 27·4^m, N 38° 17′ : 8·2, 8·3 : 209°·2 : 1″·2 : w.

Σ 2063. XVI^h 28·8^m, N 45° 49′ : 5·7, 8·2 : 194°·3 : 16″·2 : w., o.

Σ 2065. XVI^h 29·3^m, N 40° 12′ : 8, 8·7 : 218°·7 : 30″·5 : w. 7′ *n* is OΣ 313 : 7·2, 7·8 : 162°·2 : 0″·8. Perr., 152°·4 : 1″, '85.

32 (*β* 818). XVI^h 29·6^m, N 30° 43′ : 6·3, 13·5 : 33°·5 : 3″·3.

P. XVI 125. XVI^h 31·0^m, N 17° 15′ : A., 6·2, 7·5. Fine wide 7½ pair.

Σ 2068. XVI^h 31·0^m, N 47° 29′ : 8·3, 8·3 : 257°·1 : 5″·5 : v. w.

Σ 2071. XVI^h 34·2^m, N 13° 52′ : 8·7, 9 : 311°·6 : 25″·1 : o.

Σ 2079. XVI^h 35·4^m, N 23° 12′ : 7·1, 7·9 : 90°·9 : 16″·8 : w. Fr., cols. different, '76.

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36, 37 (Σ I 31). XVI^h 35·6^m, N 4° 24′ : 6, 7 : 230°·1 : 69″·7 : w.

42 (Σ 2082). XVI^h 36·1^m, N 49° 7′ : 4, 10·7 : 92°·3 : 22″·4 : very y. or gold, o. A still minuter *comes*, 12 m^s. makes a triangle, glimpsed with $3\frac{7}{10}$-in., '51. B., 10 m^s., $4\frac{1}{2}$-in., '71; with little pair in field.

ζ (Σ 2084). XVI^h 37·5^m, N 31° 47′ : 3, 6·5 : 23°·4 : 0″·9 : ysh., reddish, '26. Most remarkable bin. with mutual occultation. Per., 34·41 yrs. Doberck. Distance varies from 0″·6 to 1″·6. Ha., 64°·3 : 1″·4, '91. Closing.

Σ 2083. XVI^h 38·1^m, N 13° 48′ : 8·3, 8·8 : 336°·3 : 12″·6 : o.

Σ 2085. XVI^h 38·1^m, N 21° 47′ : 7·3, 8·8 : 309° : 6″·1 : w., o.

Σ 2087. XVI^h 38·4^m, N 23° 52′ : 8·2, 8·2 : 291°·8 : 5″·7 : w. Exquisite little object.

Σ 2091. XVI^h 38·9^m, N 41° 23′ : 7·5, 8 : 302°·2 : 1″·3 : w.

Σ 2094. XVI^h 40·0^m, N 23° 41′ : 7·3, 7·6 : 82°·8 : 1″·6 : yw. Angle dimin. *Comes* : 11 : 311°·4 : 25″·3.

46 (Σ 2095). XVI^h 41·1^m, N 28° 32′ : 7, 9 : 163°·9 : 5″ : yw., o. W., bl., '50.

Σ 2097. XVI^h 41·2^m, N 35° 55′ : 8·5, 8·7 : 89°·9 : 2″·1 : o.

Σ 2098. XVI^h 41·8^m, N 30° 11′ : 8, 9 : 147°·2 : 14″·3 : o.

Σ 2101. XVI^h 42·2^m, N 35° 49′ : 6·3, 9 : 60°·2 : 4″·3 : yw., o.

Σ 2103. XVI^h 45·0^m, N 13° 26′ : 5·2, 10 : 36°·6 : 5″·7 : blsh. w., o.

Σ 2104. XVI^h 45·1^m, N 36° 5′ : 6·2, 8 : 19°·6 : 5″·9 : w., ash. Very pretty.

52 (β 627). XVI^h 46·3^m, N 46° 10′ : 5, 10 : 309°·4 : 1″·8.

Σ 2107. XVI^h 47·9^m, N 28° 49′ : 6·5, 8 : 148°·6 : 1″·1 : ysh., blsh. De., 8, *sombre*. Ha., 254°·0 : 0″·4, '88.

56 (Σ 2110, rej.). XVI^h 50·9^m, N 25° 54′ : β 6, 11·9 : 93°·4 : 18″·1. 4 minute stars.

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Σ 2112. XVI^h 54·4^m, N 31° 56′ : 8·5, 9·5 : 260°·6 : 1″·9 : o.

Σ 2115. XVI^h 57·0^m, N 15° 5′ : 5·7, 10·5 : 238°·4 : 19″·1 : v. w., o.

Σ 2120. XVII^h 0·8^m, N 28° 14′ ; 6·4, 9·2 : 11°·4 : 3″·8 : y., v. bl., '29. 7, 9 : 0°·2 : 3″·1 : red, bl. Cols. remarkable, '36. Ha., 247°·2 : 6″·2, '88. Rect. mot. K., 7, tawny. De., y. Fr., dusky or., '76.

OΣ 324. XVII^h 4·3^m, N 31° 21′ : 6·3, 19·8 : 222°·3 : 3″·8.

Σ 2131. XVII^h 5·8^m, N 30° 28′ : 7·5, 8·5 : 179°·4 : 24″·3 : v. w., o.

Σ 2135. XVII^h 7·8^m, N 21° 20′ : 7·1, 8·4 : 166°·1 : 6″·7 : ysh., blsh. Perr., 174°·3 : 7″·1, '85.

Σ 2142. XVII^h 9·1^m, N 49° 53′ : 6·2, 10 : 116°·3 : 5″·3.

Σ 2137. XVII^h 9·4^m, N 16° 4′ : 8·2, 9·2 : 145°·4 : 4″ : w.

α (Σ 2140). XVII^h 10·1^m, N 14° 30′ : 3, 6·1 : 118°·5 : 4″·6 : v. y., intense bl. Fixed. Orange, bluish grn., '55. Sm. calls it a 'lovely object; one of the finest in the heavens,' and mentions two small stars, 10, 12 *nf*, as lilac. A. G. C., faint *comes*, β 15 m^g. : 335°·8 : 23″·5. H., 3·5 var. 3 to 4. Σ not, but 5·5 var. 5 to 7. Subsequent observations have shown that the larger star is irreg. var. Fine III Type spectrum.

δ (Σ 3127). XVII^h 11·0^m, N 24° 57′ : 3, 8·1 : 173°·7 : 26″·1 : grn., ashy w. Maw, 187°·1 : 16″·6, '88. From p.m. Pale y., blsh. grn., '50. Fletcher, y., red, '51. De., scmetimes y., usually w., azure. K., pale y., ruddy purp., '71.

68 (OΣ 328). XVII^h 13·6^m, N 33° 13′ : 4·8, 10·2 : 61°·8 : 4″·4 : w., o. 4·8 Schm., var, 4–4·6 to 5·4–6 : irreg. : red.

Σ 2152. XVII^h 14·9^m, N 45° 41′ : 8·8, 9 : 248°·8 : 1″·8 : w.

Σ 2153. XVII^h 15·3^m, N 49° 24′ : 8·6, 9·1 : 281°·8 : 1″·9 : ysh.

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ρ (Σ 2161). XVII^h 20·2^m, N 37° 14′ : 4, 5·1 : 307°·2 : 3″·6 : grn. w., grnsh. W., blsh., '50. B., smaller pair *sf*; Fr., 6·5, 9 : ± 10° : 30″ : bright y., bl. ρ is the gem of a beautiful coronet, in a large field.

Σ 2162. XVII^h 20·4^m, N 36° 33′ : 8·5, 8·9 : 277°·7 : 1″·3 : w.

Σ 2164. XVII^h 21·0^m, N 47° 22′ : 7·8, 9·3 : 16°·5 : 8″·8 : w.

Σ 2165. XVII^h 22·4^m, N 29° 32′ : 7, 8·5 : 45°·7 : 6″·7 : ysh., ash. Schi., 52°·3 : 7″·8, '87.

Σ 2168. XVII^h 23·1^m, N 35° 51′ : 7·5, 8·2 : 199°·7 : 2″·4 : y., o.

Σ 2178. XVII^h 25·9^m, N 35° 1′ : 7, 8·6 : 130°·1 : 10″·6 : ysh., blsh.

λ. XVII^h 26·7^m, N 26° 11′ : 4·5 : inserted for its curious col.; with my $3\frac{7}{10}$-in. deep, dull or. Towards this point the Solar system, according to H. and A., is moving. L. Struve places the point at XVII^h 47^m + 31°. Fr., small pair *sp* : 10, 11 : est. 90° : 5″.

Σ 2182. XVII^h 28·3^m, N 23° 56′ : 8·2, 9·2 : 0°·9 : 5″·3 : w.

Σ 2190. XVII^h 31·7^m, N 21° 4′ : 6, 9·5 : 33°·2 (23°·2 ?) : 10″·2 : blsh. w., o.

Σ 2194. XVII^h 37·0^m, N 24° 33′ : 6·2, 8·5 : 9°·4 : 16″·1 : y., ash. Orange, bl., '50. Good low-powered field *f*.

Σ 2214. XVII^h 40·4^m, N 43° 47′ : 8·5, 8·8 : 211°·7 : 19″·4 : o. De., triple, 9·5, 11 : 143°·3 : 1″·5.

Σ 2213. XVII^h 41·1^m, N 31° 10′ : 7·5, 8 : 332°·3 : 4″·3 : w.

Σ 2215. XVII^h 41·5^m, N 17° 45′ : 5·9, 7·9 : 310°·6 : 0″·7 : w., ash. Perr., 296°·5 : 0″·8, '86. Bin. 12 sec. *p* is Σ 2205 : 8·3, 8·7 : 291° : 2″·5 : v. w. Perr., 303°·6, '86.

OΣ 335. XVII^h 41·7^m, N 21° 56′ : 7·3, 8·3 : 140°·3 : 25″.

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μ (Σ 2220). XVII^h 42·6^m, N 27° 48′ : 3·8, 9·5 : 241°·3 : 29″·9 : y., o. Clear y., bl., '50. Ha., 243°·8 : 31″·5. 9·5 was found double by A. C., '56. Rapid Bin. D., 59°·3 : 1″·8, '57. Ha., 24°·8 : 0″·5, '91, closing. Per., Leushner, 45·24 years.

OΣ 336 rej. XVII^h 44·2^m, N 34° 19′ : De., 6·3, 10·3 : 164°·9 : 43″·2 : y., o. β finds *comes* 12·5 : 343°·6 : 5″·6.

Σ 2232. XVII^h 46·2^m, N 25° 19′ : 7, 8·5 : 142°·9 : 6″·5 : w., blsh.

Σ 2239. XVII^h 47·8^m, N 28° 15′ : 8·5, 9 : 318°·3 : 2″·2 : o.

Σ 2242. XVII^h 48·2^m, N 44° 55′ : 7·8, 7·8 : 327° : 3″·5 : w.

Σ 2243. XVII^h 49·8^m, N 36° 7′ : 8·3, 8·8 : 46°·7 : 1″·7 : y.

90 (β 130). XVII^h 50·0^m, N 40° 1′ : De., 5·8, 9·2 : 123° : 1″·8 : gold, azure.

Σ 2245. XVII^h 52·0^m, N 18° 20′ : 7, 7 : 294° : 2″·6 : yw., w.

Σ 2246. XVII^h 52·1^m, N 39° 31′ : 8·3, 8·8 : 102°·5 : 5″·5 : w. 0·3^m *f*, 4′ *s* is β 417 : 8, 9·5 : De., 270° : 1″·5.

Σ 2247. XVII^h 53·7^m, N 29° 29′ : 8·5, 9 : 191°·2 : 11″·4 : w.

Σ 2258. XVII^h 54·1^m, N 48° 38′ : 8·5, 8·7 : 221°·4 : 2″·6 : v. w.

Σ 2259. XVII^h 55·2^m, N 30° 3′ : 7, 8 : 278°·6 : 19″·4 : y., bl.

Σ 2263. XVII^h 56·9^m, N 26° 34′ : 8·2, 9·2 : 161°·8 : 7″·3 : w.

95 (Σ 2264). XVII^h 57·2^m, N 21° 36′ : 4·9, 4·9 : 261°·7 : 6″·1 : grnsh y., redsh. y. Sm., apple green, cherry red; so to me, and *f* star a little brighter than *p*, '50, '55. Sm. observes that 'this beautiful object presents a curious instance of difference in col. between components so nearly

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equal in brightness.' Se. thinks red the larger, grn. the brighter. Strange discrepancies as to col. P. Sm., tints var. Macdonnell, at Sydney, both gold yel. Fixed. Extremely pretty.

Σ 2267. XVII^h 58·4^m, N 40° 11′ : 8, 8 : 234°·2 : 1″·4 : w. Schi., 237°·8 : 0″·9, '87. Bin. Triplet.

Σ 2268. XVII^h 59·1^m, N 25° 22′ : 8, 9 : 218°·2 : 18″·1 : yw., w. β, 211°·6 : 20″ : with *comes* 13 : 194°·6 : 11″·2, '89.

Σ 2277. XVIII^h 0·5^m, N 48° 28′ : 6·3, 8·2 : 117°·9 : 27″·6 : w., o.

99 (A. C. 15). XVIII^h 3·2^m, N 30° 33′ : β 6, 10·7 : 24°·4 : 1″, '78. 294°·4 : 0″·7, '91. Rapid Bin. Per., 53·55 years. Gore.

Σ 2282. XVIII^h 3·3^m, N 40° 21′ : 7·2, 8·2 : 93°·2 : 2″·4 : v. w.

100 (Σ 2280). XVIII^h 3·8^m, N 26° 5′ : 5·9, 5·9 : 182°·9 : 13″·8 : grnsh. w. Blsh. w., '50; angle reversed, '55. Two faint *comites*; so Hunt.

Σ 2289. XVIII^h 5·7^m, N 16° 27′ : 6, 7·1 : 243°·1 : 1″·2 : ysh., blsh. Tarrant, 232°·1, '87.

Σ 2291. XVIII^h 6·6^m, N 34° 0′ : 8·5, 9 : 339°·2 : 25″·1 : w.

Σ 2292. XVIII^h 8·1^m, N 27° 37′ : 8, 8·1 : 261°·2 : 1″·4 : v. w.

OΣ 346. XVIII^h 11·0^m, N 19° 45′ : 7·5, 8·3 : 327°·7 : 5″·5.

Σ 2301. XVIII^h 11·6^m, N 23° 58′ : 8·5, 9 : 122°·6 : 22″·7 : ysh., bl.

Σ 2309. XVIII^h 16·0^m, N 25° 29′ : 8·5, 9 : 354°·7 : 3″·5 : w.

Σ 2319. XVIII^h 23·4^m, N 19° 14′ : 7·2, 7·6, 10 : 191°, 279° : 5″·6, 38″·4 : w., w., o.

Σ 2320. XVIII^h 23·7^m, N 24° 38′ : 7·1, 9 : 11°·4 : 1″·8 : v. w., ash. Moving?

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Σ 2330. XVIII^h 26·6^m, N 13° 6′ : 7·3, 9 : 176°·9 : 20″·3 : w., o. Ha., 173°·3 : 18″·9, '86.

Σ 2339. XVIII^h 29·4^m, N 17° 39′ : 7·2, 8 : 271°·5 : 2″·3 : w., bl.

OΣ 359. XVIII^h 31·4^m, N 23° 32′ : 6·6, 6·9 : 348°·2 : 0″·6

OΣ 358. XVIII^h 31·4^m, N 16° 55′ : 6·8, 7·2 (vars.?) : 202°·1 : 1″·8 : ysh. Schi., 197°·5, '87.

Σ 2360. XVIII^h 35·0^m, N 20° 50′ : 7·5, 8·7 : 5°·7 : 2″·5 : w., ash.

Σ 2371. XVIII^h 38·2^m, N 27° 33′ : 8·5, 8·5 : 55°·5 : 9″·6 : w.

110 (h. 2839). XVIII^h 41·4^m, N 20° 27′ : 5½, 15 : β 91°·5 : 61″·1. Pretty steady, 5½-in., '62 ; β, 11 m^s. ; Buffham, easy 6½-in. 'With' spec., '68. Wa., 5 *comites*, β fainter one, 95°·5 : 44″·7.

Σ 2401. XVIII^h 44·7^m, N 21° 3′ : 7, 8·6 : 37°·6 : 4″·1 : w., blsh.

Σ 2415. XVIII^h 50·2^m, N 20° 29′ : 6·6, 8·5 : 298°·7 : 2″ : ysh., blsh.

Stars with Remarkable Spectra and Variables.

α and 68 see under Double Stars.

X (var.). XV^h 59·6^m, N 47° 31′ : 6·0 to 7·2. Gore.

R (var.). XVI^h 1·7^m, N 18° 38′ : 8–9·2 below 13 : Per., 317·7^d. At Bonn.

U (var.). XVI^h 21·4^m, N 19° 7′ : 6·6–7·8 to 11·4–12·7 : Per., 409^d. Hencke.

30, g. (var.). XVI^h 25·4^m, N 42° 6′ : 4·7–5·5 to 5·4–6 : Irreg. Baxendell.

W (var.). XVI^h 31·7^m, N 37° 32′ : 8–8·4 to 11·5–14 : Per., 280·0^d. Dunér.

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S (var.). XVI^h 47·3^m, N 15° 6′ : 5·9–7·5 to 11·5–13 : Per., 307·6^d. At Bonn.

Es-Birm. 482a. XVII^h 7·1^m, N 40° 49′ : 7·7 : R. : III. Es.

Es-Birm. 485. XVII^h 13·8^m, N 31° 33′ : 8·5 : R. Burton.

Es-Birm. 514. XVIII^h 3·8^m, N 43° 27′ : 8 : YR. : III. Du.

Es-Birm. 516a. XVIII^h 4·8^m, N 42° 12′ : 8·9 : R. : III. Es.

T (var.). XVIII^h 5·3^m, N 31° 0′ : 6·9–8·5 to 9·8–12·7 : Per., 164·85^d. At Bonn.

Es-Birm. 521. XVIII^h 8·5^m, N 33° 15′ : 7·3 : pale ruby : Webb. Var.? Es.

Es-Birm. 522. XVIII^h 8·7^m, N 22° 48′ : 7·5 : R. : B. Var.? Es.

Clusters, Nebulæ, and Groups.

Recurved line of small stars proceeding from 7·5 m^s. ± XVI^h 33^m, N 31° 7′.*

6205 (M. 13). XVI^h 38·1^m, N 36° 37′. Superb globular cl., lying $\frac{1}{3}$ from η towards ζ, finest of its class; just visible to naked eye. Halley discovered it in 1714; M. was *sure* it contained *no stars;* but it is spangled with glittering points in a 5½-ft. achromatic, and becomes a superb object in large telescopes. h. speaks of thousands of stars, 10 or 11 to 15 or 20 m^s.; his father had estimated them at 14,000. Sm. calls it an extensive and magnificent mass of stars, with the most compressed part densely compacted and wedged together under unknown laws of aggregation. h. describes

* This is a specimen of a peculiarly interesting, but hitherto little noticed, class of objects to which the persevering student may make large and very curious additions, with an increasing conviction as to their mutual interdependence.

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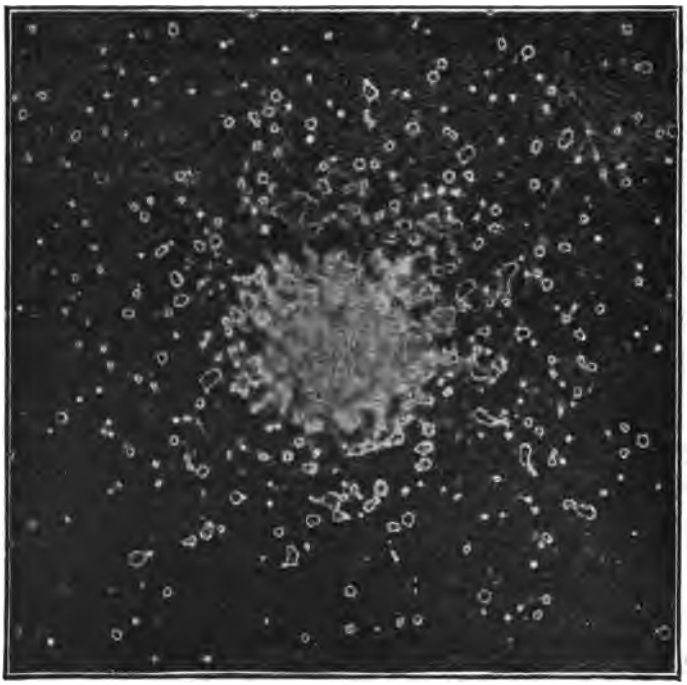
'hairy-looking curvilinear branches,' well seen with 8-in. 'With' mirror; E. of Rosse, who noticed this spiral tendency, detected also three dark 'lanes' or rifts in its



interior, beautifully seen by Buffham with 9-in. 'With' mirror. I have also perceived them. Huggins finds spectrum continuous, but red end wanting (see M. 31, And., and H. IV 26, Erid, *antea*). In Se.'s achr. the outliers, inconspicuous in ordinary instruments, fill a field of 8′. Ranyard, from an examination of the Lick

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photos., one of which is here reproduced, finds several prominence-like structures, composed of nebulous matter, and stars. Burnham sees a solitary close double star (0″·9) near the centre, and notes that in all bright compressed clusters there seems to be a remarkable absence of close double stars. Klein has well remarked that our understanding strives in vain to answer the inquiry, What is the object of these thousands on thousands suns? The mere aspect of this stupendous aggregation is indeed enough to make the mind shrink with a sense of the insignificance of our little world. Yet the Christian will not forget that, as it has been nobly said, HE took of the dust of this Earth, and with it HE rules the universe!

The neighbourhood is beautiful with a low power. A faint neb., ± 40′ *nf.* A reddish 7·7 m^g. star 1^m 27^s *f*, 3′ *n*, noted by D'A. as having a fine III Type spectrum, was found by Dunér to have changed to a continuous spectrum, or possibly Type II. The star is probably var., and should be watched, as there is a similar change in R Scuti.

6210 (Σ 5 N). XVI^h 40·3^m, N 23° 59′. Plan. neb., 8′ diam.; discovered by Σ. Very bright. D'A. = 8 m^g.; small, not sharply defined; exactly like a star out of focus, bearing power well. 111 of 5½-in. showed a glow round it. E. of Rosse, intense bl. Se. thought it resolved with a power of 1500; but the spectroscope shows it gaseous. Rather more than 1° *sp* 51, 5 m^g.

6229 (H. IV 50). XVI^h 44·2^m, N 47° 42′. Plan. neb., faint with 3 7/10-in., but beautifully grouped in a triangle with two 6 m^g. stars. D'A., very crowded cl.

6341 (M. 92). XVII^h 14·1^m, N 43° 15′. Very fine cl., though not equal to M. 13; less resolvable; intensely bright in centre. D'A. justly calls it, with his 11-in. achr. at

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Copenhagen, *acervus adspectu jucundissimus.* In H.'s reflectors, 7′ or 8ᵗ diam. Buffham, with 9-in. spec., found stars brighter and more compressed than in M. 13, but blaze resolved by glimpses. Spectrum as M. 13. E. of Rosse, possibly spiral, nucleus barely, if at all, resolved.

Wreath of stars 11 mᵉ., attached to 8·5 mᵉ., ± XVIIIʰ 58·4ᵐ, N 26° 22′.

Group. ± XVIIʰ 59·0ᵐ, N 19° 33′ : three stars in line, 8, 7, 8 : w., w., pale red; *nf* of which is a fainter group with similar line of stars 10 mᵉ.

Double chain of stars, 9 mᵉ., ± XVIIIʰ 6ᵐ, N 23° 45′.

111. XVIIIʰ 42·6ᵐ, N 18° 4′. Has an interesting large field *n*, including bright or. star-B.

HYDRA.

A very lengthy and not very interesting constellation to the unaided eye; but containing some telescopic work.

Double Stars.

Σ 1198. VIIIʰ 6·1ᵐ, N 1° 34′ : 8, 8·2 : 157°·5 : 33″ : w. Vars.?

Σ 1245. VIIIʰ 30·5ᵐ, N 6° 58′ : 6, 7 : 25°·4 : 10″·3 : ysh., yr. Finely grouped with other stars; 1° *np* δ.

Σ 1255. VIIIʰ 34·4ᵐ, N 6° 8′ : 7, 8 : 31°·1 : 26″·6 : yw., w.

Σ 1260. VIIIʰ 35·8ᵐ, S 11° 48′ : 7·8, 8·3 : 301°·4 : 4″·9 : w.

Σ 1270. VIIIʰ 40·3ᵐ, S 2° 14′ : 6·6, 7·6 : 259°·1 : 4″·7 : yw., blsh.

ϵ (Σ 1273). VIIIʰ 41·5ᵐ, N 6° 48′ : 3·8, 7·8 : 195°·6 : 3″·2 : y., bl. *Comes* ruddy, '51. Missed by H. Maw, 227°·6, '90. Bin. Fl., 700 yrs. Hall and β, very minute *comes*,

[HYDRA]

192°·2 : 20″·5. Sa., easy 12½ 'Calver' spec. Schi., at Milan, divides 3·8 into 4½, 5 : 142°·0 : 0″·2. *β*, 179°·6, '92. Rapid Bin. This makes up a remarkable Ternary system.

Σ 1281. VIII^h 42·5^m, N 0° 23′ : 7·8, 8·9 : 329°·6 : 25″ : yw. Separating. De., 30″, '67.

β 586. VIII^h 42·7^m, S 16° 41′ : 6·5, 9 : 53°·2 : 0″·7.

ρ (A. G. C. 3). VIII^h 43·1^m, N 6° 13′ : *β* 5, 12·5 : 144°·9 : 12″·4.

15 (*β* 587). VIII^h 46·6^m, S 6° 49′ : 6, 9 : 165°·1 : 0″·5 : 151°·9 : '92. Bin. Two distant *comites*, 10·6 and 11·2.

OΣ 195. VIII^h 48·6^m, N 8° 48′ : 7·4, 7·9 : 138°·9 : 9″·5.

Σ 1292. VIII^h 48·7^m, S 0° 12′ : 8·8, 9 : 188°·8 : 5″·8 : w.

17 (Σ 1295). VIII^h 50·6^m, S 7° 35′ : 7·2, 7·3 : 358°·8 : 4″·3 : w. Star *s* the largest, '51. De., 6·7, 7·2. *β*, pair ± 45′ *s*. De., 7·9, 9 : 171°·9 : 1″.

β 210. VIII^h 52·2^m, S 17° 3′ : De., 7, 7·4 : 181°·6 : 2″·4.

Σ 1302. VIII^h 56·0^m, N 3° 8′ : 8·7, 8·8 : 228°·1 : 2″·4 : w. *β*, *comes* 12 : 269°·5 : 31″·9.

Σ 1309. IX^h 1·5^m, N 3° 14′ : 8, 8·3 : 273°·1 : 11″·3 : w. 2^m 52^s *f*, 7′ *n* is OΣ 197 : 7·4, 9 : 60°·8 : 1″·5.

β 336. IX^h 7·1^m, S 16° 24′ : 8, 9 : De., 238°·3 : 1″·9.

θ (H*h*. 322). IX^h 9·2^m, N 2° 44′ : h., 5, 12 : *β*, 175°·2 : 52″·7. Es., good test. 12 not seen $3\frac{7}{10}$-in. achr. *β*, 10·5 m^s.

Σ 1329. IX^h 10·6^m, S 0° 48′ : 8·3, 8·5 : 245°·7 : 27″·2 : w. Approaching.

β 212. IX^h 11·3^m, S 7° 56′ : 7, 9 : De., 230°·5 : 1″·5.

β 588. IX^h 11·5^m, N 1° 9′ : 6½, 11 : 123°·2 : 2″·4.

Σ 1343. IX^h 14·7^m, N 5° 27′ : 8·7, 9·2 : 271° : 10″ : w.

Σ 1347. IX^h 18·1^m, N 3° 57′ : 6·7, 8 : 310°·5 : 21″·3 : w. Rsh. w., grey or blsh., '51.

Σ 1348. IX^h 19·2^m, N 6° 47′ : 7·5, 7·6 : 334°·3 : 1″·1 : w. Ha., 323°·4 : 2″·7, '85.

[HYDRA]

29 (β 590). IX^h 22·5^m, S 8° 47′ : 6·7, 11·7 : 176°·8 : 10″·8 *s* of *a*.

τ^1 (H*h*. 333). IX^h 24·1^m, S 2° 19′ : Sm., 5·5, 8·5 : 2°·9 : 64″·9 : pale w., dusky. Greenish y., lilac, '51.

β 339. IX^h 26·2^m, S 15° 18′ : 8, 9·5 : Dc., 215°·8 : 1″·3.

Σ 1365. IX^h 26·4^m, N 1° 55′ : 7, 8 : 162°·8 : 3″·1 : ysh., blsh. w.

Σ 1416. X^h 7·5^m, S 15° 35′ : 6·7, 8·5 : 275°·8 : 11″·3 : w., o. Separating?

Σ 1473. X^h 42·7^m, S 15° 6′ : 8, 8·9 : 10°·1 : 30″·7 : w. 21′ *n* is Σ 1474 : 6·9, 8 : 22°·2 : 71″·7 : v. w. *Comes* to 8, 8 : 193°·9 : 6″·6

Jacob 143. XI^h 24·7^m, S 23° 55′ : Wilson, 6·4, 8·6 : 79°9 : 8″·5.

H*h*. 376. XI^h 27·3^m, S 28° 43′ : Sm., 5·5, 7 : Morton, 211°·4 : 8″·8. 7 var.? $\frac{1}{2}$ m^g. diff., '52; so Morton, '57; Fr., '76, who makes 5·5 decided y. h., 6, 6 : '35; Gore, 7 larger than 5·5, '75. C.p.m.

β 1246. XIV^h 13·3^m, S 25° 22′ : 5·5, 13·3 : 187°·1 : 3″ : distant 11.

52 (β 940). XIV^h 22·4^m, S 29° 3′ : 5, 11·3 : 276°·8 : 4″.

54 (H*h*. 449). XIV^h 40·2^m, S 25° 1 : Wilson, 6, 7·5 : 129°·2 : 9″·0.

59 (β 239). XIV^h 52·8^m, S 27° 15′ : 6, 6 : 123°·7 : 0″·9. 311°·4, '89. Bin.

Stars with Remarkable Spectra and Variables.

S (var.). VIII^h 48·3^m, N 3° 27′ : 7·5–8·7 below 12·2 : Per., 257^d. Hind.

T (var.). VIII^h 50·8^m, S 8° 46′ : 7–8·1 below 13 : Per. 289·4^d. Hind.

[HYDRA]

Es-Birm. 293. IX^h 15·5^m, N 0° 36′ : 7·5 : orange : III : D'A. Var.? : 8·3 bl. near. Es.

α (Cor Hydræ). IX^h 22·7^m, S 8° 13′ : var.? Perfect II Type.

Es-Birm. 302. IX^h 46·4^m, S 22° 33′ : 6·6 : R. A. IV : Se. Var. Es.

U (var.). X^h 32·6^m, S 12° 52′ : 4·5 to 6·1–6·3 : Irreg. Gould. IV.

V (var.). X^h 46·8^m, S 20° 43′ : 6·7 to 9·5 : Irreg. Gould. IV.

R (var.). XIII^h 24·2^m, S 22° 46′ : 3·5–5·5 to 9·7 : Per., 425·15^d. Montanari, 1672.

(Var.). XIII^h 43·7, S 27° 52′ : 7 to? By photo. At Harvard.

Nebulæ and Cluster.

3242 (H. IV 27). X^h 20·0^m, S 18° 8′. Plan. neb. 2° s of μ, resembling Jupiter, Sm. says, in size, equable light, and col. I found it bright; a little elliptical *np*, *sf*, of a steady pale bl. light, bearing high powers. H. did not resolve it. Se., whose beautifully defining glass accomplished marvels, with 1000, found it a unique object; within a circular nebulosity two clusters, connected by two semicircular arches of stars, forming a sparkling ring, with one star on the hazy ground of the centre. D'A. made out two nuclei near the limb. Huggins sees an oval ring surrounded by broad faint nebulosity; but its spectrum is that of gas, and the bright points can hardly be solid matter.

4590 (M. 68). XII^h 34·2^m, S 26° 12′. Globular cl. of stars, well resolved; 12 m^s. stars, one red.

5061 (H. I 138). XIII^h 12·6^m, S 26° 19′. Very bright, small, round, nucleus, 10 m^s.

LACERTA.

A small and not distinctly marked asterism. Glorious sweeping from Cygnus in this direction, and towards head of Cepheus.

Double Stars.

4 (β 694). $22^h\ 57{\cdot}9^m$, N 44° 0′ : 6, 8·5 : 352°·3 : 0″·5. Angle increasing. Two *comites*.

Σ 2876. $22^h\ 7{\cdot}7^m$, N 37° 9′ : 7·7, 9·2 : 68°·4 : 11″·8 : w., o.

Σ 2882. $22^h\ 9{\cdot}9^m$, N 37° 15′ : 9·2, 9·2 : 326°·5 : 3″·2 : o.

Σ 2890. $22^h\ 11{\cdot}2^m$, N 49° 23′ : 8·5, 8·7 : 11°·7 : 9″·1 : w.

Σ 2891. $22^h\ 12{\cdot}4^m$, N 47° 29′ : 8·2, 9·2 : 309°·2 : 12″·4 : yw., w.

Σ 2894. $22^h\ 14{\cdot}5^m$, N 37° 16′ : 6, 8·2 : 193°·5 : 15″·3 : w., ash. W., bl., '50; Du., '68; De., '75; 6 decided y. β, distant *comes*, 12·5.

OΣ 469. $22^h\ 16{\cdot}0^m$, N 34° 37′ : 7·2, 8·8 : 280°·6 : 31″·8. Distance dimin.

Σ 2902. $22^h\ 19{\cdot}4^m$, N 44° 51′ : 7·1, 8 : 89°·9 : 6″·4 : y., w.

Σ 2917. $22^h\ 26{\cdot}6^m$, N 53° 1′ : 8, 8 : 71°·2 : 4″·7 : w.

Σ 2916. $22^h\ 27{\cdot}0^m$, N 40° 42′ : 7·3, 8·8 : 335°·3 : 45″·2 : y., o. 8·8 has *comes* 10·2 : 30°·6 : 3″·5. Es., another 13·6 : 118°·0 : 16″·6 from 8·8.

8 (Σ 2922). $22^h\ 31{\cdot}4^m$, N 39° 6′ : 6, 6·5, 10·2, 8·5 : A B, 185°·7 : 22″·5; B C, 155°·7 : 28″·2; B D, 131°·6 : 66″·5 · v. w., v. w., o., o. 6, 6½, 10½, 9; first two white, perhaps tinged with y.; third uncertain; fourth bl. De., 6, 7, 10·3, 8·7. Es., *comes* to D, 14 m^s. 200° ± 10″.

[LACERTA]

Σ 2926. XXII^h 33·0^m, N 38° 23′ : 8·5, 8·5 : 336°·1 : 20″·8 : w.

13 (h. 1803). XXII^h 39·6^m, N 41° 18′ : OΣ 5·4, 10·8 : 129°·9 : 14″·8.

Σ 2942. XXII^h 41·5^m, N 38° 57′ : 7, 9·2 : 282°·1 : 2″·7 : rsh. gold, ash. *β, comes* 12 : 232° : 10″·9.

Σ 2946. XXII^h 45·1^m, N 39° 59′ : 8, 8 : 253°·1 : 5″ : w.

β 382. XXII^h 49·2^m, N 44° 13′ : De., 6, 7·9, 10·7 : 205°·7, 353°·6 : 1″·1, 26″·4 : w., azure, o.

Star with Remarkable Spectrum and Variables.

S (var.). XXII^h 24·6^m, N 39° 48′ : 8·4 below 12. Unknown. By photo. At Harvard.

R (var.). XXII^h 38·8^m, N 41° 51′ : 8·3–9·3 below 13·5 : Per., 299·8^d. Deichmüller.

Es-Birm. 735. XXII^h 43·7^m, N 54° 38′ : 8·5 : R. : III. Es.

Clusters.

7243 (H. VIII 75). XXII^h 11·3^m, N 49° 23′. Fine cl. Quickly followed by beautiful field with three pairs.

Fine field, ± XXII^h 15^m, N 45° 29′.

7. XXII^h 27·1^m, N 49° 46′. Points out a noble field. 5 a 5 m^s. star, 1° *sp* is a fine object, deep orange, with blue attendant, in rich vicinity.

LEO.

A fine constellation, the fore part of which is marked to the naked eye by a *sickle* of conspicuous stars. At the bottom of the handle, and very nearly in the pathway of the sun, is the leader, Regulus, the Lion's Heart.

Double Stars.

[LEO]

Σ 1332. IX^h 11·6^m, N 24° 6′ : 7·2, 7·5 : 16°·3 : 5″·6 : w.

κ (β 105). IX^h 18·8^m, N 26° 37′ : De., 4·9, 10·5 : 203°·8 : 3″ : y., bl.

Σ 1355. IX^h 22·0^m, N 6° 40′ : 7·2, 7·2 : 328°·3 : 2″·8 : w.

Σ 1353. IX^h 22·2^m, N 16° 11′ : 8·5, 8·8 : 314°·7 : 3″·1 : o.

ω (Σ 1356). IX^h 23·1^m, N 9° 30′ : 6·2, 7 : 153°·9 : 1″ : y., '25. Ha., 101°·2 : o″·7, '91. Bin. Per., 110·82 yrs. Doberck.

Σ 1360. IX^h 25·2^m, N 11° 3′ : 7·4, 7·7 : 243° : 14″·3 : w.

Σ 1364. IX^h 26·1^m, N 20° 27′ : 7·7, 9·2 : 156°·1 : 15″·1 : w., o.

6 (OΣΣ 101). IX^h 26·6^m, N 10° 10′ : De., 5, 9·5 : 74°·5 : 37″ : gold, azure. Deep or., grn., $3\frac{7}{10}$-in., '51; 9·5, lilac, $5\frac{1}{2}$-in., '62; pale or., bl., '82. Fr., pale or., purp., '77.

Σ 1389. IX^h 46·7^m, N 27° 28′ : 8, 9 : 329°·2 : 1″·7 : ysh. Ha., 313°·4 : 2″·1, '86.

Σ 1399. IX^h 51·5^m, N 20° 15′ : 6·8, 7·8 : 175°·1 : 30″·1 : w.

31 (Anderson). X^h 2·6^m, N 10° 30′ : β, 5, 13½ : 44°·4 : 7″·6.

α (Σ II 6), Regulus. X^h 3·1^m, N 12° 28′ : 1·5, 8·4 : 306°·6 : 176″·9 : blsh. w., w. Σ and Se. considered that 8·4 is moving with 1·5, which is confirmed by β. Winlock doubles *comes*. β, 8·4, 13 : 88°·5 : 3″·3. Huggins finds in α a motion from our eye of 12 to 17 miles per second.

Σ 1413. X^h 6·9^m, N 16° 51′ : 8·9, 8·9 : 278°·5 : 2″·4 : yw.

Σ 1417. X^h 9·7^m, N 19° 38′ : 8·2, 8·2 : 261°·4 : 2″·4 : w.

ζ (Σ I 18). X^h 11·0^m, N 24° 0′ : 3·8, 6 : 343°·1 : 314″·4 : y., w. Separating.

[LEO]

Σ 1419. x^h 11·7^m, N 10° 37′ : 8·4, 9·1 : 223°·9 : 4″·4 : w., blsh.

39 (OΣ 523). x^h 11·8^m, N 23° 37′ : 5·8, 11·4 : 296°·9 : 6″·6 : y., o. C.p.m.

γ (Σ 1424). x^h 14·4^m, N 20° 21′ : 2, 3·5 : 103°·4 : 2″·5 : gold, grnsh. red. Maw, 114°·3 : 3″·4, '88. Y., grnsh. y., '49; y., deeper y., '60. H., w.; rsh. w. K., 3·5 cool grey grn. Bin. 407 yrs., Doberck. Very fine object; Σ, finest in N. sky. Wa., in contact, 2½-in. achr. Schm. thinks the neighbour, 40, var.; so Fr. Not in A.

Σ 1426. x^h 15·3^m, N 6° 56′ : 7·8, 8·3, 9·3 : 256°·7, 9°·1 : 0″·6, 7″·4 : ysh., ysh., o. Tarrant, 276°·0 : 0″·9, '87.

β 594. x^h 17·4^m, N 15° 52′ : 6, 10·5 : 143°·4 : 1″·6.

Σ 1429. x^h 19·5^m, N 25° 8′ : 8·3, 8·3 : 270°·6 : 1″·5 : o. Ha., 77°·3 : 1″, '85.

Σ 1431. x^h 20·3^m, N 9° 17′ : 8, 9·7 : 65°·9 : 3″·2 : w., blsh. w. Closely *f* 44, 6 m^s., or., which is 2° *p* ρ.

Σ 1434. x^h 21·7^m, N 18° 35′ : 8·5, 8·5 : 269°·6 : 6″·1 : o. Very pretty.

OΣ 220. x^h 23·9^m, N 10° 41′ : 7·1, 9 : 62°·3 : 1″·3.

Σ 1439. x^h 24·6^m, N 21° 19′ : 8, 8·5 : 131°·4 : 2″ : w. Ha., 119°·9 : 1″·8, '88.

Σ 1442. x^h 26·5^m, N 22° 34′ : 7·2, 7·8 : 155°·2 : 13″·3 : v. w.

Σ 1447. x^h 28·3^m, N 23° 52′ : 7·1, 8·9 : 125°·2 : 4″·3 : v. w., blsh.

Σ 1448. x^h 28·9^m, N 22° 7′ : 7, 9 : 258°·7 : 10″·9 : ysh., o.

49 (Σ 1450). x^h 29·8^m, N 9° 10′ : 6, 8·7 : 161°·1 : 2″·4 : w., blsh.

Pair. x^h 30·8^m, N 12° 11′ : 8, 9 : pale or., pale bl. Kn., 337° : 55″·6.

Σ 1468. x^h 39·3^m, N 21° 14′ : 8·7, 8·7 : 334°·6 : 3″·7 : v. w

[LEO]

β 596. x^h 44·1^m, N 17° 41′ : 6·5, 13 : 277°·3 : 2″·4.

Σ 1476. x^h 44·2^m, S 3° 30′ : 7·2, 8 : 353°·7 : 1″·9 : w. Perr., 0°·6 : 2″·2, '85.

Σ 1477. x^h 44·3, N 13° 28′ : 8·3, 8·8 : 275°·5 : 17″·6 : yw., w.

Σ 1482. x^h 47·0^m, N 8° 0′ : 8, 8·9 : 305°·3 : 11″·7 : w.

54 (Σ 1487). x^h 50·2^m, N 25° 17′ : 5, 7 : 102°·8 : 6″·2 : grnsh. w., bl.

55 (β 1076). x^h 50·6^m, N 1° 16′ : 5·8, 10·3 : 49°·7 : 1″.

Σ 1500. x^h 54·9^m, S 2° 56′ : 7·6, 8·2 : 331° : 1″·1 : ysh. Ha., 311°·9 : 1″·3, '86.

Σ 1502. x^h 56·8^m, N 15° 10′ : 8·5, 9·3 : 284°·5 : 12″·4 : ysh., o.

Σ 1504. x^h 58·8^m, N 4° 11′ : 7·5, 7·6 : 275°·7 : 1″·1 : w. Ha., 106°·1, '88.

Σ 1507. xi^h 0·9^m, N 7° 35′ : 8·2, 10·5 : 164°·8 : 8″·0 : ysh., o. 10·5 very difficult, 80; steady, 144, so as to be a good comparative test. Wa., 2½-in. achr. Closely $f\chi$, but not quite so near it as a larger star more n in the field.

65 (β 599). xi^h 1·9^m, N 2° 30′ : 5½, 11·5 : 82°·4 : 1″·8.

Σ 1517. xi^h 8·5^m, N 20° 40′ : 7·3, 7·3 : 287°·8 : 1″·1 : ysh. Tarrant, 276°·2 : 0″·5, '87. Σ, OΣ, vars.? Bin C.p.m. Closely *sp* δ.

Σ 1527. xi^h 13·8^m, N 14° 49′ : 6·9, 8·1 : 10°·1 : 3″·9 : v. w., blsh. Fl., 6·9 var. col. and mag.? Maw, 13°·5 : 4″·2, '88. De., 6·8, 7·7.

Σ 1529. xi^h 14·3^m, S 1° 6′ : 7, 8 : 250°·9 : 9″·3 : yw., ashy. A fine object.

ι (Σ 1536). xi^h 18·7^m, N 11° 5′ : 3·9, 7·1 : 92°·4 : 2″·2 : ysh., bl. Maw, 61°·4 : 2″·6, '88. Bright or., grnsh. y., '48. Just divided, 80, pale y., pale bl. or grn., '49. W., tawny, '70. Fl., 7·1 var. m^g. and col. De., 4·6, 7·4.

[LEO]

Σ 1537. $11^h\ 19{\cdot}2^m$, N 21° 10′ : 7·6, 8·6 : 356°·4 : 2″·5 : w., ashy.

Σ 3070. $11^h\ 19{\cdot}6^m$, S 3° 50′ : 8·8, 9·2 : 276°·3 : 8″ : o. Near ϕ.

83 (Σ 1540). $11^h\ 21{\cdot}7^m$, N 3° 34′ : 6·3, 7·3 : 150° : 29″·6 : w. Y., lilac, '52 ; y., pale ruddy purple, '56. De., 5·8, 7·3. W., azure. Relatively fixed ; c.p.m.

τ (Σ I 19). $11^h\ 22{\cdot}8^m$, N 3° 25′ : 5, 7 : 169°·6 : 94″·8 : y., w. Approaching.

Σ 3072. $11^h\ 25{\cdot}6^m$, S 6° 10′ : 7·4, 10·4 : 331°·8 : 9″·4 : ysh., o.

88 (Σ 1547). $11^h\ 26{\cdot}6^m$, N 14° 56′ : 6·4, 8·4 : 319°·9 : 15″·3 : ysh., bl. Σ c.p.m.

Σ 1548. $11^h\ 27{\cdot}0^m$, S 2° 59′ : 7·7, 8·7 : 127°·3 : 10″·3 : o.

90 (Σ 1552). $11^h\ 29{\cdot}5^m$, N 17° 21′ : 6, 7·3 : 209°·4 3″·0 : w., blsh. w. Sm., a distant 9·5.

Σ 1564. $11^h\ 34{\cdot}4^m$, N 27° 31′ : 8·2, 9 : 86°·4 : 5″·1 : ysh., o.

Σ 1565. $11^h\ 34{\cdot}4^m$, N 19° 33′ : 7, 8 : 304°·1 : 21″·5 : w., blsh. w.

93 (Σ II 7). $11^h\ 42{\cdot}8^m$, N 20° 47′ : 4·7, 8·4 : 355°·5 : 74″·3 : y., w. Curious field ; pair repeated. Two large groups of faint neb. one 4^m *f n* ; the other *sp*.

β 603. $11^h\ 43{\cdot}5^m$, N 14° 51′ : 6·4, 10·3 : 328°·7 : 1″·2.

β. $11^h\ 44{\cdot}0^m$, N 15° 8′ : Sm., $2\frac{1}{2}$, 8 : bluish, dull red. Very wide. Probably receding from us as δ.

Stars with Remarkable Spectra and Variables.

R (var.). $11^h\ 42{\cdot}2^m$, N 11° 54′ : 5·2–6·7 to 9·4–10 : Per., $312{\cdot}87^d$. Koch.*

* Hind says, 'It is one of the most fiery-looking variables on our list—fiery in every stage, from max. to min., and is really a fine

[LEO]

V (var.). $11^h\ 54{\cdot}5^h$, N 21° 45′ : 8·6 below 13·5 : Per., 274^d. Becker.

U (var.). $10^h\ 18{\cdot}7^m$, N 14° 31′ : 9·5 below 13·5 : Per.? Peters.

W (var.). $10^h\ 48{\cdot}3^m$, N 14° 15′ : 9? below 14 : Per., $394{\cdot}3^d$. Peters.

56. $10^h\ 50{\cdot}9^m$, N 6° 43′ : 6·5 : yr. : III. Vogel.

S (var.). $11^h\ 5{\cdot}7^m$, N 6° 0′ : 9–10 below 13 : Per., 190^d. Chacornac.

72. $11^h\ 9{\cdot}9^m$, N 23° 38′ : 5 : III. D'A.

T (var.). $11^h\ 33{\cdot}3^m$, N 3° 56′ : 10? below 13·5 : Per.? Peters.

Nebulæ.

2903, 2905 (H. I 56, 57). $11^h\ 26{\cdot}5^m$, N 21° 56′. Long, with two nuclei, rather faint. H., equal. h. and D'A., *f* very faint. E. of Rosse, oblique spiral, resolved.

3379, 3384 (H. I 17, 18). $10^h\ 42{\cdot}6^m$, N 13° 6′. Two faint neb., *p* much larger and brighter, with stellar nucleus. H., a third, making right-angled triangle. Sm., a neat little pair, *nf* well seen 80. Among the neb., in a round patch of 2° or 3°, in a region of few stars. $1^m\ 4^s$ *p* 36^s is M. 96. Very bright neb. E. of Rosse, spiral. $2^m\ 48^s$ *p* M. 96 is M. 95. E. of Rosse, two ellipses, centre resolved?

telescopic object in a dark sky, when its colour forms a striking contrast with the steady wh. light of the 6 m^s. a little to the *n*.' One of the finest of its most mysterious class, which deserves a special investigation, in which amateurs may do good service without costly instruments. The red hue, so conspicuous in the above specimen, prevails more or less among them; inequality or irregularity in the times of increase and decrease is common; and some appear hazy at *min*. Baxendell has noticed a singular tendency to collection in groups.

[LEO]

3521 (H. I 13). $11^h\ 0{\cdot}7^m$, N 0° 30′. Large, elongated. D'A., 6′ × 45″, with stellar nucleus.

3593 (H. I 29). $11^h\ 9{\cdot}4^m$, N 13° 22′. Bright, elongated.

3599 (H. II 49). $11^h\ 10{\cdot}2^m$, N 18° 39′. Small, round. Most remarkable if, as D'A. thinks, var. '31, brighter than H. III 27, $1^m\ 22^s$ *f*; '61, I class (so Schönfeld); '63, sometimes II, at others *invisible;* '64, not above III, and fainter than H. III 27.

3627, 3623 (M. 66, 65). $11^h\ 15{\cdot}0^m$, N 13° 32′. Two rather faint objects, elongated in different directions, in a low-powered field, with several stars. *s* (M. 66) rather the larger and brighter; D'A., '*magnifica;*' 6′ × 2′. The other resolved in centre. Between *ι* and *θ*, a little *f*.

3655 (H. I 5). $11^h\ 17{\cdot}7^m$, N 17° 8′. Pretty bright.

3817 (h. 947). $11^h\ 36{\cdot}7^m$, N 10° 52′. First of a faint group. H. I 21, 1^m *p* 70′ *n*, a large bright neb.

LEO MINOR.

This small constellation contains several pairs and neb., but the latter too faint for general interest.

Double Stars.

Σ 1369. $11^h\ 29{\cdot}1^m$, N 40° 25′ : 7, 8 : 147°·4 : 24″·7 : w.

Σ 1374. $11^h\ 35{\cdot}2^m$, N 39° 25′ : 7, 8·3 : 274°·7 : 3″·3 : ysh., v. bl. Maw, 283°·1 : 3″·5, '90.

Σ 1421. $12^h\ 12{\cdot}5^m$, N 28° 1′ : 7·5, 8·5 : 330°·4 : 4″·4 : w., blsh.

Σ 1443. $12^h\ 27{\cdot}5^m$, N 38° 12′ : 9, 9 : 156°·3 : 4″·8 : o.

Σ 1449. $12^h\ 29{\cdot}4^m$, N 35° 39′ : 8·5, 8·7 : 289°·2 : 36″ : o.

Σ 1458. $12^h\ 33{\cdot}9^m$, N 32° 13′ : 8, 8·2 : 215°·4 : 17″·7 : w.

[LEO MINOR]

Σ 1459. x^h $34{\cdot}5^m$, N 38° 55′ : 8, 8·5 : 153·1 : 5″·2 : y., w.

40 (β 913). x^h $37{\cdot}6^m$, N 26° 51′ : 6, 13′ : 122°·8 : 10″·9.

Variables.

R (var.). ix^h $39{\cdot}6^m$, N 34° 58′ : 6·1–7·8 to 13. Per., $370{\cdot}5^d$. Schönfeld.

16. ix^h $44{\cdot}1^m$, N 40° 6′ : 7 : R. : var. Fr. Var. Es. III. Du.

Nebulæ.

2683 (H. I 200). $viii^h$ $46{\cdot}5^m$, N 33° 48′. H. calls this a very beautiful object, 8′ × 3′. Sm. saw a splendid centre. Scarcely worth the search with $3\frac{7}{10}$, but in a very fine district, a little *p* the most *n* group of Cancer.

3245 (H. I 86). x^h $21{\cdot}7^m$, N 29° 1′. D'A., very bright, oblong. E. of Rosse, 6′ × 40″, with nucleus like a star 11 m^s.

LEPUS.

A little asterism under the legs of Orion; so near the horizon that it can only be well seen on the meridian, and opportunities must not be thrown away.

Double Stars.

β 314. iv^h $54{\cdot}5^m$, S 16° 32′ : 6·5, 8·3 : 326°·9 : 1″, Distant 8·2.

Σ 631. iv^h $56{\cdot}1^m$, S 13° 39′ : 7·2, 8·7 : 104°·8 : 5″·4 : w

ι (Σ 655). v^h $7{\cdot}7^m$, S 11° 59′ : 4·2, 10·5 : 337°·6 : 12″·8 : grnsh., o. I found *comes* certain, '80; a glimpse star, 144

of $3\frac{7}{10}$-in. This seems to exemplify Sm.'s remark, that, among very minute stars, the smallest sometimes shine with a keener light than those of larger apparent magnitude.

κ (Σ 661). v^h 8·7^m, S 13° 3′ : 5, 7·9 : 358°·7 : 3″·1 : ysh. bl. Yw., grey, '51.

h. 3750. v^h 16·2^m, S 21° 20′ : β, 6, 10·5 : 283°·3 : 4″·3.

h. 3752. v^h 17·7^m, S 24° 52′ : 6, 9·5 : O. Stone, 104°·7 : 3″·5, with 3rd star near, 9 m^s.

β (β 320). v^h 24·0^m, S 20° 51′ : 3·5, 10·9 : De., 292°·3 : 3″·1. 1^m 51^s *p*, 2′ *n* is β 319 : 7·8, 11·5 : 226°·6 : 3″·7.

α (h. 3766). v^h 28·3^m, S 17° 54′ : H. C. Wilson, 4, 9·5 : 156°·1 : 35″·4. About 6^m *f* is h. 3780, a multiple star : De., 7, 8, 9, 8·5 : 6°·2, 136°, 298°·5 : 76″·3, 89″·6, 126″·6. β has divided 7 (De., 6·8, 8·3 : 144°·5 : 0″·7) and 9 (De., 9·3, 10 : 357°·5 : 1″·3). Beautiful cl. for small telescopes. Gore.

γ (H*h*. 199). v^h 40·4^m, S 22° 28′ : Sm., 4, 6·5 : 349° : 92″·9 : light y. 6·5 pale grn., '32; flushed, '52. To me pale y., garnet, '51; so Sa., '74. C.p.m. A third star, 13 m^s., 345° : 45″ from 6·5. Gore, easy 3-in., and Es., $2\frac{1}{2}$-in.

ζ. v^h 42·4^m, S 14° 51′. β sees pair 45′ *nf* 6, 10 : De., 179°·4 : 2″·7.

Σ 875. vi^h 7·5^m, S 13° 7′ : 8·7, 9·8 : 335° : 6″. h., r., v. grn.

Stars with Remarkable Spectra and Variables.

R (var.). iv^h 55·0^m, S 14° 57′ : 6–7 to 8·5? Per., 436·1^d. Schmidt. Hind's 'Crimson Star,' 1845, described by him as 'of the most intense crimson, resembling a blood-drop on the background of the sky; as regards depth of colour, no other star visible in these latitudes could be compared with it.' Type IV. B sees curious field, three pairs and triplet, 1° 40′ *s*, a little *p*.

[LEPUS]

Es-Birm. 115. v^h 0·5^m, S 22° 1′ : 8·7 : R. : Holden : III. Es.

Es-Birm. 120. v^h 6·7^m, S 11° 58′ : 6·5 : R. : Morton : Var. magnificent III type. A little *sp* ι.

Es-Birm. 170. vi^h 2·7^m, S 21° 48′ : 6·1 : R. : III. Pickering.

19. vi^h 3·4^m, S 19° 9′ : 5·8 : R. : III. Pickering.

Clusters.

1904 (M. 79). v^h 20·1^m, S 24° 37′. Tolerably bright with my 64, blazing in centre; higher powers showed it mottled. Beautiful cl. in H.'s 20-ft. reflector, nearly 3′ in diam. 4° *s*, a little *p* β, closely *f* a 6 m^g. star.

LIBRA.

S. declination combines with long days and late sunsets to give trouble in loking for the objects in this constellation, which are, however, well worth the pains.

Double Stars.

Σ 1833. xiv^h 17·4^m, S 7° 19′ : 7, 7 : 166°·7 : 4″·9 : w.

Σ 1837. xiv^h 19·3^m, S 11° 14′ : 7·1, 8·7 : 326°·9 : 1″·4 : w., o. Ha., 303°·2, '88. Bin. C.p.m.

β 117. xiv^h 25·8^m, S 15° 10′ : 8, 9 : De., 95°·6 : 2″·4.

5 (Holden 20). xiv^h 40·4^m, S 15° 2′ : β, 6·3, 11 : 249°·8 : 2″·7.

Σ 1876. xiv^h 41·1^m, S 6° 58′ : 8·1, 8·6 : 51°·7 : 1″·2 : ysh. Ha., 72°·9, '87. Bin.

β 346. xiv^h 42·9^m, S 16° 55′ : De., 7·2, 8 : 235°·7 : 1″·2.

μ (β 106). xiv^h 43·9^m, S 13° 44′ : 5·5, 6·3 : 333°·2 : 1″·5. β seen with 2½-in. achr. Three *comites*, 14·5, 13·9, 12·8 : 283°·7, 185°·5, 232°·5 : 18″·3, 26″, 27″·2.

[LIBRA]

α^2. XIV^h 45·2^m, S 15° 35′. Forms a wide pair with α^1, 3, 6. Pale y., whitish.

P. XIV 212 (H*h*. 457). XIV^h 51·6^m, S 20° 56′ : 6, 8 : Piazzi, 251°·4 : 9″·4 in 1806. H. C. Wilson, 293°·0 : 15″·7, '86, who says that this pair resembles very much 61 Cygni; both stars have a large p.m. in the same direction, and the brighter is moving a little faster than the fainter. β sees four *comites*.

18 (Σ 1894). XIV^h 53·5^m, S 10° 44′ : 6, 10·2 : 38°·8 : 19″·5 : y., o.

β 1085. XIV^h 53·7^m, S 4° 35′ : 6, 13·2 : 19°·5 : 9″·3

β 119. XV^h 0·2^m, S 6° 38′ : De., 8, 8·5 : 313°·1 : 1″·5. *nf* δ.

Σ 3090. XV^h 3·6^m, S 0° 38′ : 8·3, 8·7 : 275°·5 : 1″·8 : yw.

ι (H*h*. 465). XV^h 6·5^m, S 19° 25′ : 5, 9 : 110°·5 : 57″·5. β doubles *comes*, 10, 10 : 24°·8 : 1″·8.

H*h*. 467. XV^h 8·8^m, S 18° 3′ : Sm., 8, 9 : 141°·7 : 48″·4. Silvery w., '35 (Fr., redsh., '76), and pale grey.

β. XV^h 11·6^m, S 9° 1′ : 2·5. Inserted for its beautiful pale grn. hue, very unusual among conspicuous stars; deep green, like deep blue, is unknown to the naked eye.

Σ 1939. XV^h 22·1^m, S 10° 37′ : 8, 9 : 134°·6 : 9″·3 : w.

h. 4783. XV^h 26·0^m, S 19° 50′ : 6, 9 : Sm., 282°·6 : 11″·8. 9 very small to me, '52.

Σ 1962. XV^h 33·3^m, S 8° 28′ : 6·3, 6·4 : 187°·1 : 11″·8 : w. Fr., y.; m^{ag}. over-rated, '76. A striking object. De., 6·2, 6·3.

β 121. XV^h 33·5^m, S 27° 21′ : 8·2, 8·2 : 277°·5 : 1″·5. ½° *nf* 39.

β 122. XV^h 34·7^m, S 19° 27′ : De., 7, 7·4 : 204° : 1″·8.

Σ 1966. XV^h 36·6^m, S 10° 49′ : 9, 9 : 232°·5 : 23″·2 : o. Vars.?

[LIBRA]

β 35. $xv^h\ 37{\cdot}1^m$, S 15° 42′ : De., 7, 8·5 : 99°·5 : 2″·3.

Σ 3096. $xv^h\ 42{\cdot}5^m$, S 5° 0′ : 9, 9 : 85°·6 : 3″·1 : 0.

Σ 3097. $xv^h\ 45{\cdot}4^m$, S 8° 44′ : 8·8, 9·2 : 181° : 4″ : 0.

Stars with Remarkable Spectra and Variables.

V (var.). $xiv^h\ 34{\cdot}8^m$, S 17° 14′ : 9·3 to 12·2. Per., 370^d. Schönfeld.

Es-Birm. 419. $xiv^h\ 52{\cdot}3^m$, S 12° 2′ : 7 : R. : Holden. Magnificent III. Es.

δ (var.). $xiv^h\ 55{\cdot}6^m$, S 8° 7′ : 5 to 6·2 : Algol type : Per., $2^d\ 7^h\ 51^m\ 22{\cdot}8^s$. Schmidt. White.

T (var.). $xv^h\ 5{\cdot}0^m$, S 19° 38′ : 9·2–10·2 below 14·7 : Per., 238^d. Palisa.

Y (var.). $xv^h\ 6{\cdot}4^m$, S 5° 38′ : 8½ to? : Per., 327^d. Bauschinger.

Es. 205. $xv^h\ 9{\cdot}8^m$, S 2° 2′ : 8 : R. : magnificent III. Es.

S (var.). $xv^h\ 15{\cdot}6^m$, S 20° 2′ : 7·6–8·3 below 13 : Per., $192{\cdot}3^d$. Borrelly.

Var. $xv^h\ 18{\cdot}5^m$, S 22° 34′ : 8·4 below 11. At Harvard by photo.

X (var.). $xv^h\ 30{\cdot}4^m$, S 20° 50′ : 9·5–9·9 below 14 : Per., $163{\cdot}6^d$. Peters.

W (var.). $xv^h\ 32{\cdot}2^m$, S 15° 51′ : 9·8 below 14 : Per. 206^d. Peters.

U (var.). $xv^h\ 36{\cdot}2^m$, S 20° 52′ : 9 below 14 : Per., $226{\cdot}2^d$. Peters.

R (var.). $xv^h\ 47{\cdot}9^m$, S 15° 56′ : 9·2–10 below 13 : Per., 730^d. Pogson.

Es-Birm. 443. $xv^h\ 49{\cdot}0^m$, S 20° 31′ : 8·3 : R. : Holden. IV? Es.

Es-Birm. 444. $xv^h\ 50{\cdot}5^m$, S 20° 29′ : 8·2 : R. : Holden. III? Es.

Clusters.

[LIBRA]

5897 (H. VI 19). xv^h $11{\cdot}7^m$, S 20° 39′. Globular cl. of small stars.

5904 (M. 5). xv^h $13{\cdot}5^m$, N 2° 27′. Beautiful assemblage of minute stars (h. 11–15 m^s.), greatly compressed in centre. M. saw none. H. about 200 with 40-ft. reflector. E. of Rosse, curved exterior branches; seen also by Buffham with 9-in. mirror. Packer finds two stars among the outliers var. Confirmed at Harvard. Closely *np* 5 Serp. 5 m^s.

LYNX.

A troublesome constellation, excepting with an equatorial mounting, as there are few conspicuous leaders among a number of tolerably considerable stars, which are puzzling in the finder. The beauty of its pairs will, however, reward a persevering observer.

Double Stars.

Σ 866. vi^h $8{\cdot}9^m$, N 62° 14′ : 7·7, 8·8, 8·2 : 193°·4, 264°·7 : 17″·8, 78″·8 : w.

4 (Σ 881). vi^h $13{\cdot}2^m$, N 59° 24′ : 6·4, 7·9 : 89°·0 : 0″·8 : w., '30. Maw, 102° : 0″·9, '90. Bin.

Σ 935. vi^h $30{\cdot}5$, N 52° 22′ : 8·2, 9 : 322°·2 : 3″·4 : w.

Σ 936. vi^h $31{\cdot}1^m$, N 58° 11′ : 7, 8·7 : 254°·9 : 1″·6 : y., bl. Angle increasing.

Σ 946. vi^h $36{\cdot}1^m$, N 59° 32′ : 7·2, 9 : 133°·5 : 4″·2 : w., bl. Σ thinks 9 var.; and this, Sm. observes, 'awakens considerations of peculiar interest, it having been surmised that certain small acolyte stars shine by reflected light.' 9 very minute, '54. Exactly *p* 12.

[LYNX]

12 (Σ 948). VI^h 37·4^m, N 59° 33′ : 5·2, 6·1, 7·4 : 153°·7, 304°·2 : 1″·5, 8″·7 : two grnsh. w., blsh. Maw, 124°·9, 305°·3 : 1″·6, 8″·4, '89. Two yw., 7·4 ruddy, '54; so Hunt. Elongated, 80; divided at times, 144. Bin. 485·8 yrs. Gore.

Σ 958. VI^h 39·9^m, N 55° 49′ : 6, 6 : 256°·7 : 5″·1 : w. Y., '52, '57. Easy, naked eye; furthest E. of scattered group.

Σ 960. VI^h 41·6^m, N 53° 9′ : 7·3, 9·2 : 66°·4 : 21″·9 : w., o.

14 (Σ 963). VI^h 44·2^m, N 59° 34′ : 5·9, 7·1 : 51°·5 : 0″·9 : gold, purp. Tarrant, 69°·1 : 0″·5, '87. Divided by Buffham, 9-in. spec. 7 grn., '69. Bin.

Σ 968. VI^h 44·9^m, N 52° 48′ : 8, 9 : 287°·3 : 20″·6 : w.

15 (OΣ 159). VI^h 48·6^m, N 58° 34′ : 5·1, 6·2 : 317°·4 : 0″·6 : y., gold. Hall, 7°·5 : 0″·8, '91. Bin. *β, comes* 12½ : 341°·4 : 23″·6.

Σ 1001. VI^h 55·0^m, N 54° 19′ : 7·1, 8·7 : 64° : 8″·9 : gold, o. *Comes* to 8·7, 9 : 354°·8 : 1″·7.

Σ 1002. VI^h 55·8^m, N 56° 35′ : 8·5, 9 : 316°·6 : 30″·2 : o.

Σ 1009. VI^h 57·7^m, N 52° 53′ : 6·7, 6·8 : 159°·2 : 2″·9 : v. w.

Σ 1025. VII^h 4·6^m, 55° 58′ : 7·5, 7·8 : 141°·2 : 22″·7 : w.

Σ 1033. VII^h 6·9^m, N 52° 43′ : 7·4, 8 : 282° : 1″·4 : v. w.

Σ 1044. VII^h 9·1^m, N 47° 54′ : 8·5, 8·7 : 167°·2 : 12″·4 : o.

Σ 1050. VII^h 11·7^m, N 55° 7′ : 7·3, 8 : 19°·2 : 19″·4 : w.

20 (Σ 1065). VII^h 14·6^m, N 50° 20′ : 6·6, 6·8 : 253°·4 : 15″ : v. w.

19 (Σ 1062). VII^h 14·7^m, N 55° 28′ : 5·3, 6·6 : 312°·4 : 14″·7 : w. Sm., distant 8.

21 (β 758). VII^h 21·5^m, N 48° 24′ : 6, 11·2 : 93°·1 : 16″·6.

Σ 1086. VII^h 21·5^m, N 42° 57′ : 7·5, 9 : 102°·3 : 12″·2 : vy., o.

[LYNX]

OΣ 174. VII^h 29·1^m, N 43° 16′ : 6·5, 8·1 : 84°·3 : 2″.

Σ 1174. VII^h 57·5^m, N 47° 35′ : 8, 8·5 : 215° : 5″·7 : w.

Σ 1184. VIII^h 2·8^m, N 38° 11′ : 8, 8·5 : 340°·4 : 27″·1 : yw., w.

Σ 1187. VIII^h 3·2^m, N 32° 32′ : 7·1, 8 : 71° : 1″·6 : w. Ha., 50°·3 : 2″·1, '88. Bin.

Σ 1200. VIII^h 8·6^m, N 50° 5′ : 8·5, 8·5 : 0°·7 : 8″·4 : w.

Σ 1204. VIII^h 9·3^m, N 38° 47′ : 8, 9 : 103°·9 : 11″·8 : o.

Σ 1211. VIII^h 11·7^m, N 39° 19′ : 8·7, 9·2 : 132°·7 : 1″·6 : w.

O$\Sigma\Sigma$ 93. VIII^h 18·0^m, N 42° 20 : De., 6, 8 : 168°·3 : 76″·6 : gold, azure. Fr., or. red, fine bl.

Σ 1222. VIII^h 19·8^m, N 37° 53′ : 8, 9 : 46°·6 : 10″ : w.

Σ 1225. VIII^h 22·4^m, N 51° 32′ : 8·5, 8·5 : 194°·2 : 3″·5 : w.

Σ 1234. VIII^h 25·4^m, N 55° 42′ : 7, 8·3 : 71°·3 : 20″·8 : y., o.

Σ 1242. VIII^h 29·0^m, N 47° 29′ : 8·6, 9·3 : 170°·5 : 2″·5 : w.

Σ 1256. VIII^h 35·9^m, N 49° 40′ : 7·8, 9·3 : 212°·3 : 25″·5 : ysh., o.

Σ 1258. VIII^h 36·4^m, N 49° 14′ : 7·1, 7·4 : 331°·4 : 9″·6 : w. About 2° *np* ι Ursæ.

Σ 1263. VIII^h 38·6^m, N 42° 4′ : 7·6, 8·2 : 359° : 4″·9 : yw., w., 1828. Ha., 19°·7 : 47″·3, '89. From large p.m.

Σ 1259. VIII^h 40·7^m, N 38° 49′ : 8·5, 9 : 340°·9 : 5″ : w.

Σ 1274. VIII^h 42·6^m, N 38° 43′ : 7, 8·7 : 40°·8 : 8″·9 : v. w., ash.

Σ 1282. VIII^h 44·5^m, N 35° 26′ : 7, 7 : 277°·4 : 3″·4 : yw., v. w.

Σ 1289. VIII^h 48·1^m, N 43° 59′ : 7·7, 8·5 : 4°·2 : 3″·8 : w.

Σ 3120. VIII^h 49·3^m, N 44° 3′ : 7·8, 8·8 : 348°·1 : 1″·5 : yw

[LYNX]

Σ 1296. VIII^h 53·0^m, N 35° 20′ : 8·5, 9 : 71°·2 : 2″·8 : o.

Σ 1333. IX^h 12·3^m, N 35° 48′ : 6·6, 6·9 : 39°·4 : 1″·4, *np a*. A naked eye star from combined impression.

38 (Σ 1334). IX^h 12·6^m, N 37° 14′ : 4, 6·7 : 240°·2 : 2″·7 : grnsh. w., bl. Maw, 237°·3 : 3″, '89. Yw., tawny, '50, '52. Fr., 6, pale y., '77. C.p.m.

Σ 1338. IX^h 14·7^m, N 38° 38′ : 7, 7·2 : 121°·1 : 1″·8 : w., '29. Ha., 158°·3 : 1″·5, '88.

a, 40. IX^h 15·0^m, N 34° 49′ : 4 : or., has 8 or 9 m^s. attendant, violet, which is Σ 1342 : 8·6, 11 : 326°·9 : 17″·9.

39 (Σ 1340). IX^h 15·7^m, N 50° 57′ : 6·5, 8·3 : 319°·4 : 6″·1 : w., blsh. Main, 4, 7·5, '63. De., 6·5, 8·5, '64; 7, 8, '68.

Σ 1344. IX^h 17·2^m, N 39° 35′ : 8·5, 9·2 : 106°·6 : 3″·6 : w.

41 (OΣΣ 99). IX^h 22·1^m, N 46° 2′ : De., 5·6, 7·8 : 161°·8 : 82″·5 : y., w. or azure. Deep y., lilac; a 10 m^s. star forms a triangle, '52. De. suspected 5·6 oblong in 148°, 1876.

Stars with Remarkable Spectra and Variables.

1. VI^h 8·7^m, N 61° 33′ : 5·5 : III. D'A.

R (var.). VI^h 53·1^m, N 55° 28′ : 7·8–8 below 13. Per., 380^d. Krueger.

Es-Birm. 231. VII^h 20·9^m, N 46° 10′ : 6·7 : R. : var.? : III. Es.

Es-Birm. 247. VII^h 37·4^m, N 39° 4′ : 7·7 : yr. : III. Du.

Es-Birm. 292. VIII^h 14·4^m, N 57° 7′ : 5·8 : yr. : III. Du.

LYRA.

For its size, one of the most remarkable constellations, full of beautiful fields, and adorned by one of the great leaders of the firmament.

Double Stars.

[LYRA]

β 1253. XVIII^h 29·0^m, N 30° 29′ : 6·2, 13·5 : 156°·3 : 7″·4.

Σ 2349. XVIII^h 32·9^m, N 33° 23′ : 5·5, 10·7 : 205°·5 : 7″·3 : blsh. w., o. Wa., minute *comes*.

Σ 2351. XVIII^h 33·0^m, N 41° 11′ : 7·4, 7·4 : 339°·8 : 5″·2 : w. Minute, but pretty.

α (Σ II 9). XVIII^h 33·6^m, N 38° 41′ : 1, 10·5 : 137°·8 : 43″ : blsh. w., o., 1836. Wega. To my sight, inferior to Sirius only. H. and h. have ranked Arcturus and Capella higher: probably differences of colour affect materially the estimates which different eyes form of magnitude—a supposition entertained by Sm., as well as by other observers. Wollaston's experiments, from which he allowed Wega but $\frac{1}{6}$ of the light of Sirius, must surely have involved some fallacy. Humboldt thought it twinkled less than Arcturus and Procyon. Its colour to me pale sapphire —a lovely gem. Its enormous real bulk is evident from its very minute and doubtful parallax, giving perhaps 18 yrs. of light passage. Huggins thinks that it is approaching us at 44 to 54 miles per second. The optical attendant, whose distance is increasing (Es., 159°·8 : 51″·3, '92) is a well-known test; my $3\frac{7}{10}$-in. sometimes showed it in favourable weather. I have thought it easier with 80 than 144; De. thinks it brighter than formerly. His mean m^g. is 8·8. It must be looked for very near the rays of α, as there are other very minute stars at greater distances in the field. It has been detected by Erck with $2\frac{1}{10}$-in. of a $7\frac{1}{2}$-in. achr., glimpsed by Wa. with $1\frac{6}{10}$-in. of $4\frac{3}{10}$-in. achr., and seen with $8\frac{1}{2}$-in. 'With' mirror less than 30^m after sunset. Buckingham, and others, with 9 and $21\frac{1}{4}$-in.

aperture, have seen three other closer and fainter *comites.** Winnecke one, 298°·8 : 46″·9, '64. Ha., 292°·9 : 51″·5, '81. Penrose one, 5½-in. achr. De la Rue one often suspected. Buckingham thinks them var. 6^m *p*, 5′ *s*, is Σ 2338 : 8·5, ysh., 9·7, 8 : 300°·5, 209°·1 : 13″·4, 77″·1.

Σ 2356. XVIII^h 34·5^m, N 28° 36′ : 8, 9 : 47°·1 : 1″ : y., ysh. Perr., 57° : 1″·2, '83.

Σ 2358. XVIII^h 34·8^m, N 30° 38′ : 8·8, 9 : 216°·5 : 2″·6 : o.

Σ 2362. XVIII^h 34·9^m, N 35° 58′ : 7·1, 8·4 : 180°·2 : 4″ : yw., blsh.

Σ 2367. XVIII^h 36·6^m, N 30° 12′ : 7, 7·5 : 68°·3 : 0″·4 y. *β*, 107° : 0″·1, '91. Bin. An 8·4 : 193°·9 : 14″·1 : blsh.

Σ 2372. XVIII^h 38·5^m, N 34° 39′ : 6·7, 8·2 : 84°·2 : 25″·1 : w., blsh. D., *comes* 12.

Σ 2376. XVIII^h 39·9^m, N 30° 18′ : 7·7, 8·4 : 63°·8 : 22″·3 : w.

Σ 2380. XVIII^h 40·0^m, N 44° 50′ : 6·7, 8·2 : 10°·2 : 25″·8 : y., blsh. w.

ϵ^1, ϵ^2 (Σ I 37). XVIII^h 41·1^m, N 39° 30′ : 172°·9 : 207″·1. Each star double. ϵ^1 (Σ 2382) : 4·6, 6·3 : 26°·1 : 3″·0 : grnsh. w., blsh. w. Y., tawny or rose colour, '49. Ha., 14°·8 : 3″·1, '88. ϵ^2 (Σ 2383) : 4·9, 5·2 : 155°·2 : 2″·6 : v. w. Ha., 133°·0 : 2″·3, '88. 'The naked eye,' Sm. observes, 'sees an irregular-looking star near Wega, which separates into two pretty wide ones under the slightest optical aid. Each of these two will be found to be a fine binary pair.' So I see it, and probably most observers. H., however, Bessel at thirteen years of age, and many others, have divided it with the naked eye. Period of ϵ^1 perhaps 2000 yrs.; ϵ^2 in half that time. The pairs have been thought to be connected, but the measures of the last fifty years show no motion. Between them lie three much smaller stars;

* The large modern telescopes do not show them.

one 9·5 (D.), 10·1 (De.) obvious; two—the *debilissima* of h.—excessively minute,* 13 m^s., on each side of the line joining ϵ^1, ϵ^2; in very fine weather I have had glimpses of one, and suspicions of the other, with $3\frac{7}{10}$-in.—an aperture for which they are excellent tests. In very fine air Wa. has seen them with $2\frac{1}{2}$-in. achr. Grover has found them alternately var.; so Squire and Fr., who has seen a little star *p* brighter than either. There are about six or seven other extremely faint points in the group, some of them very difficult tests, though Holden has seen several with 3-in. achr. Σ surmised alternate var. in the component of ϵ^2. This most beautiful object, which I have seen well with $2\frac{1}{2}$-in., lies $1\frac{1}{2}°$ *nf* α. 47 sec. *f*, 27′ *s* is Σ 2392 : 8·2, 10·2, 9·3 : 317°·2, 178°·5 : 2″·7, 23″·3. 54′ *s* of this is Σ 2393 : 7·3, 10 : 22°·5 : 10″·4 : red, o. Es., *comes* bl.

ζ (Σ I 38). XVIII^h 41·3^m, N 37° 30′ : 4·2, 5·5 : 149°·7 : 43″·7 : grnsh. w. Y., grnsh., '49; pale y., pale lilac, '50. β, two *comites*, 15·7, 13·2 : 48°·7, 274°·4 : 26″·9, 43″·4. Third 11·8, more distant.

Σ 2394. XVIII^h 42·1^m, N 41° 58′ : 8·7, 9·2 : 201°·5 : 6″·6 : ysh., o.

Σ 2390. XVIII^h 42·2^m, N 34° 25′ : 7·3, 8·7 : 157°·9 : 4″·2 : w., o.

Σ 2397. XVIII^h 43·4^m, N 31° 17′ : 7·2, 9·7 : 267°·4 : 3″·7 : y., bl.

β (Σ I 39). XVII^h 46·3^m, N 33° 15′ : 3, 6·7 : 149°·8 : 45″·8 : y., w. The large star is var. 3·4 to 4·5 in 12^d 21^h 46^m 58·3^s, two *maxima* and two unequal *minima* occurring within that time, in which Schm. has detected minor variations, two other companions with a minute neat pair, make

* This was, presumably, h.'s meaning; not the faintest possible objects, as may have sometimes been supposed.

up a fine field. Sm., '34, marked β 'very w., and splendid;' I found it, '49, '50, '55, decidedly yellower than γ, which he calls at the same epoch bright y.; h. and South call it w., '24; Mädler pure w.; Main y., '62; De., sometimes w., sometimes y.; γ on the contrary, I saw w., or very pale y., '50, '55; $5\frac{1}{2}$-in. showed both very pale, but β the yellower, '62. Schm. made them both whitish y., '44–'55. Se. found, in '66, in β, but with much difficulty, a bright line spectrum. Other observers see dark and bright lines, variable, but not at present distinctly connected with the light variation. γ is suspected var., and has four faint attendants. The closest (OΣ 544) 12 m^s. : 296°·4 : 13″·9.

δ (*Hh.* 586). XVIII^h 51·0^m, N 36° 47′ : 4, 5 : Fr., 5, 6, '77. Fine or., w. Heis, double to naked eye. Fine III type spectrum. Glorious field for low powers. 17^s *p* δ^1 24′ *n* is β 137 : De., 8·2, 8·7 : 123°·8 : 1″·2.

OΣ 525. XVIII^h 51·2^m, N 33° 49′ : 5·1, 10·3, 7·1 : 131°·3, 350°·5 : 1″·2, 45″·5 : y., o., bl. Beautiful miniature of β Cygni with two minute companions. D. calls 10·3 most difficult to measure, and nearly *min. vis.* of his $6\frac{1}{2}$-in. achr. OΣ thinks it var., as De. makes it 8 and 9. I held it pretty steadily with $9\frac{1}{2}$-in. spec. A little *sf* is Σ 2421 : 8, 8·7 : 68°·8 : 21″·1 : w.

Σ 2419. XVIII^h 51·6^m, N 29° 6′ : 8·7, 8·8 : 179°·5 : 3″·2 : v. w.

β 648. XVIII^h 53·3^m, N 32° 47′ : 6, 9·5 : 312°·5 : 0″·6, '78. 247°·7 : 1″·3, '91. Rapid Bin.

Σ 2427. XVIII^h 54·6^m, N 38° 5′ : 8·5, 9 : 63°·6 : 44″·2 : o. 9 *comes* 9·2 : 80°·1 : 6″·9. In interesting group.

Σ 2430. XVIII^h 55·5^m, N 29° 27′ : 8·5, 8·5 : 359°·3 : 1″·9 : v. w.

Σ 2441. XVIII^h 59·0^m, N 31° 15′ : 7·7, 9·3 : 291°·9 : 5″·2 : ysh., o. Perrotin, 281°·1, '85.

[LYRA]

Σ 2448. XIX^h 0·1^m, N 35° 36′ : 8·2, 8·2 : 193°·2 : 2″·4 : yw.

Σ 2456. XIX^h 2·3^m, N 38° 22′ : 8·2, 8·2 : 13°·6 : 29″·1 : w. Ha., 6°·1 : 24″·8, '88.

Σ 2458. XIX^h 2·9^m, N 27° 36′ : 8·5, 9, 7·5 : 227°·7, 244°·3 : 10″·9, 70″·4 : o.

Σ 2459. XIX^h 3·3^m, N 25° 49′ : 8·4, 9·1 : 233° : 13″·7 : w.

17 (Σ 2461). XIX^h 3·7^m, N 32° 20′ : 5·7, 9·8 : 330°·6 : 3″·7 : ysh., blsh. Wilson and Seabroke missed *comes*, '73. Maw, 312°·7 : 3″·7, '88. C.p.m. About 2¼° *n* are two wide pairs in a large sprinkled field.

Σ 2466. XIX^h 4·0^m, N 29° 38′ : 8, 8·5 : 109°·3 : 2″·3 : v. w.

Σ 2469. XIX^h 4·4^m, N 38° 46′ : 7·6, 8·7 : 120°·9 : 1″·3 : w.

Σ 2467. XIX^h 4·5^m, N 30° 39′ : 8·6, 9 : 263° : 10″·1 : o.

Σ 2470. XIX^h 5·1^m, N 34° 36′ : 6·7, 8·2 : 271°·6 : 12″·9 : w. 8·2 pale bl., '82.

Σ 2472, 2473. XIX^h 5·1^m, N 37° 45′ : Σ 2472 : 7·5, 9·2 : 336°·5 : 17″·1. Σ 2473 : 9, 9·2 : 293°·2 : 6″·2. The pairs are 75″ apart; between them a minute star, De., 12 m^s. Sa., several other minute *comites*.

Σ 2474. XIX^h 5·4^m, N 34° 25′ : 6·7, 8 : 258°·7 : 17″·3 : ysh., ashy. 8 ruddy, '82.

Σ 2481. XIX^h 7·8^m, N 38° 36′ : 8, 8 : 234°·3 : 3″·8 : yw. Perrotin, 41°·6 : 4″·1 : 8·6. Se., split *comes* : 9. De., 69°·8 : 0″·4. Ternary.

Σ 2483. XIX^h 8·5^m, N 30° 10′ : 7·2, 8·3, 8·5 : 319° 237° : 9″·7, 71″·1 : w.

η (Σ 2487). XIX^h 10·4^m, N 38° 58′ : 4, 8·1 : 85° : 27″·9 : bl., ash. Y., grnsh., or blsh. in 3$\frac{7}{10}$-in. and Bishop's 7-in. achr., '49, '50; 4 pale y., 5½-in., '62. Fr., yw., indigo, '79; De., w., azure. A low-powered field includes two other small pairs, *sp* and *f*; B. adds a third.

[LYRA]

OΣ 371. XIX^h 11·9^m, N 27° 16′ : 6·8, 6·9 : 154°·1 : 0″·8. Triple, 9 : 267°·8 : 47″·8.

Σ 2491. XIX^h 12·2^m, N 28° 6′ : 7·9, 9·2 : 206°·7 : 1″·1 : o. Perr., 214°·4, '85.

θ (Hλ. 608). XIX^h 12·9^m, N 37° 57′ : 5, 10 : y., bl. is in a fine field.

Σ 2505. XIX^h 16·2^m, N 35° 21′ : 8, 8·7 : 314°·9 : 9″·9 : y., bl.

Stars with Remarkable Spectra and Variables.

β (var.); δ, see under Double Stars.

Es-Birm. 545. XVIII^h 28·9^m, N 36° 55′ : R. B. IV. Se. Var. 7·5–9 : B., Safarik and Es., by photo.

Es-Birm. 550. XVIII^h 32·3^m, N 37° 35′ : 8 : pale R. W.

Es-Birm. 555. XVIII^h 34·8^m, N 39° 35′ : 6·5 : yr. : III. Du.

Es-Birm. 559. XVIII^h 38·9^m, N 36° 30′ : 7, two appearances : R. Gage.

Es-Birm. 561. XVIII^h 39·4^m, N 36° 52′ : R. W. IV. Se. Var. 7–9. Safarik and Es., by photo.

Es-Birm. 564. XVIII^h 39·9^m, N 39° 12′ : 6·5 : R. W. Or D., two *comites* : var. : III. Es.

Es-Birm. 566. XVIII^h 41·2^m, N 33° 5′ : 7·7 : R. B. III. Es.

R (var.). XVIII^h 52·3^m, N 43° 49′ : 4 to 4·7 : Per., 46^d. Baxendell.

Es-Birm. 579. XVIII^h 55·6^m, N 40° 33′ : 6·5 : yr. : III. Du.

Es-Birm. 596. XIX^h 15·0^m, N 27° 5′ : 6·7 : R. Buckingham. III. Es.

Es-Birm. 599. XIX^h 20·3^m, N 35° 59′ : 7·9 : yr. : III. Du.

Nebula, Cluster, and Groups.

[LYRA]

Triplet, ± XVIII^h 45^m, N 28° 22′.

6720 (M. 57). XVIII^h 49·9^m, N 32° 54′. The only annular neb. accessible by common telescopes; fortunately, easily found, ⅛ of the distance from β towards γ. It is somewhat oval, and bears magnifying well. Its light I have often imagined fluctuating and unsteady, like that of some other plan. neb.: an illusion arising probably from an aperture too small for the object. Schr. and Harding found variable patches in it, 1797–8. E. of Rosse thought it resolvable, and saw several wisps or appendages within and without it. D'A. perceived *np* edge brightest, and two small stars there. No stars are traceable with the 18½ and 26-in. American achrs.; yet Se. reduced it to minute stars, glittering like finely powdered silver, and Chacornac also resolved it with the Foucault silvered mirror of 2½ ft. Nevertheless, Huggins finds nothing but luminous gas. But in how strange a form, and how marvellously preserved in incandescence! Nor can we so much as conjecture its distance or magnitude. A minute star *f*; h., 11 m^s., D'A., certainly only 14, 1861? Yet Sa. caught it with 3-in. achr., '74. Denza's photo. shows over 800 stars, one of which is in the centre.

Bright broad group. XVIII^h 52·4^m, N 41° 56′.

Pretty group. XVIII^h 54·6^m, N 38° 7′. Sweeping between Lyra and Cygnus exceedingly fine.

6779 (M. 56). XIX^h 12·7^m, N 30° 0′. Faintish, perhaps resolvable with 3$\frac{7}{10}$-in.; in fine field and rich region, between 3° and 4° *np* β Cygni. Sm., 'a globular cl. in a splendid field.' H., 11–14 m^s.

MONOCEROS.

Inconspicuous to the naked eye, but rich in groups and clusters from including a brilliant part of the Galaxy.

Double Stars.

3 (β 16). v^h 57·1^m, S 10° 36′ : 5·5, 10 : K., 356°·1 : 1″·8.

4 (β 17). vi^h 3·8^m, S 11° 8′ : 6, 10·4, 10·8 : 180°·4, 246°·8 : 3″·2, 8″·9.

Σ 869. vi^h 6·0^m, S 9° 49′ : 7·5, 8·5 : 279° : 24″·3 : w., o.

β 566. vi^h 9·7^m, S 4° 32′ : 6·5, 12·5 : 209°·9 : 1″·9.

β 323. vi^h 9·7^m, S 1° 41′ : De., 8·5, 10·2 : 96°·2 : 2″·4.

5 (h. 384). vi^h 10·0^m, S 6° 14′ : 4·5. Or. has *comes* 18 m^s.; est. 30° : 35″. Sa., easy 6½-in. spec.

Σ 898. vi^h 16·4^m, N 11° 1′ : 8·3, 8·8 : 121° : 6″·1 : w.

Σ 3116. vi^h 16·8^m, S 11° 44′ : 6·2, 10·4 : 19°·2 : 4″·5.

8 (Σ 900). vi^h 18·5^m, N 4° 38′ : 4, 6·7 : 25°·9 : 13″·9 : ysh., blsh. Golden y., lilac, '50. B., faint *comes*, est. 12 : 50° : 60″–70″. Sa., est. 35° : 90″; between two minuter stars. Glorious low-power field.

Σ 901. vi^h 19·5^m, N 10° 34′ : 7·7, 9·5 : 247°·5 : 20″ : w., o.

Σ 910. vi^h 21·6^m, N 0° 30′ : 8·3, 8·8 : 170°·9 : 0″·7 : ysh. In slow retrograde motion. A 6·5 y. : 150°·6 : 66″·1. A low-powered field includes 77 Orionis, a fine 6 m^s. y. star, with this pair *np*, and another *sp* : a noble spectacle.

Σ 914. vi^h 21·9^m, S 7° 27′ : 6·7, 9 : 297°·6 : 21″ : vw., o.

Σ 915. vi^h 22·9^m, N 5° 20′ : 8, 9 : 39°·1 : 5″·9 : w.

11 (Σ 919). vi^h 24·0^m, S 6° 58′ : 5, 5·5, 6 : AB 130° : 7″·2; BC : 101°·7 : 2″·5. W., ysh. w, grey or blsh., '51. Hunt 5 or., '62. So Sa., '75. H., the discoverer in 1781, call this "one of the most beautiful sights in the heavens."

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Fr., a naked-eye star. Packer, var. At Harvard the spectrum is found double, the bright F. line changing its place like the lines in β Lyræ. *β comes*, 12·5; 56°·1 : 25″·8. Sa., a more distant 15 m^s.

Σ 921. VI^h 25·6^m, N 11° 19′ : 6, 8·2 : 3°·8 : 16″·3 : yw., blsh. w.

Σ 926. VI^h 26·3^m, N 5° 51′ : 7·3, 8·7 : 287°·1 : 10″·7 : yw., ash.

14 (Σ 938). VI^h 29·4^m, N 7° 39′ : 7, 11·2 : 206°·7 : 10″·3 : v. w., o.

Σ 939. VI^h 30·6^m, N 5° 23′ : 8·1, 8·7, 9 : 106°·2, 49°·3 : 29″·8, 39″·8 : o. Beautiful.

15 S (Σ 950). VI^h 35·5^m, N 10° 0′ : 6, 8·8, 11·2 : 208°·7, 12°·9 : 2″·8, 16″·6 : green, bl., o. Ha., 213°·6, 13°·5 : 2″·9, 16″·3, '86. *Comes* well seen, another smaller and more remote *np*, 5½ in., '64. D. had measured these. Three other pairs in an irregular transverse line above. One, Σ 952; 9, 9 : 295°·2 : 13″·6, another De., 9·1, 10·2 : 45°·9 : 3″·6. Fine group *s*, containing Σ 951 : 8·5, 10·7 : 309° : 21″·3. Σ 3117 : 8·9, 9·4 : 93°·2 : 0″·6. Σ 953 : 7·5, 8 : 330°·9 : 7″·1, ysh., blsh. Σ 954 : 7·7, 10·2 : 153°·5 : 12″·7. Σ 3118, 30 sec. *f*, 6′ *s* : 174°·8 : 2″·4. The large star, 15 *S*, is var., 4·9 to 5·4 in 3^d 10^h 38^m, according to Winnecke.

Σ 949. VI^h 35·7^m, N 5° 48′ : 8·5, 9 : 287°·7 : 3″·4 : w.

β 897. VI^h 45·7^m, S 0° 25′ : 6·6, 12 : 30°·9 : 5″·6.

Σ 987. VI^h 49·2^m, S 5° 44′ : 7·7, 7·8 : 163°·5 : 1″·1 : o.

Σ 986. VI^h 49·4^m, N 9° 38′ : 8·3, 8·8 : 167°·2 : 5″·2 : v. w.

β 326. VI^h 51·0^m, N 2° 26′ : De., 8, 9·5 : 62°·8 : 1″·2.

Σ 998. VI^h 52·0^m, S 5° 21′ : 8·2, 8·5 : 205°·5 : 3″·1 : w.

β 327. VI^h 53·5^m, S 2° 54′ : De., 7·5, 8 : 100°·1 : 1″, with 11·5 : 102°·6 : 13″·2.

Σ 1003. VI^h 53·8^m, S 9° 2′ : 9, 9·2 : 320°·3 : 3″·9 : o.

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Σ 1010. VI^h 56·4^m, S 2° 58′ : 7·8, 8·8 : 4°·5 : 23″·7 : w.

Σ 1015. VII^h 0·0^m, S 5° 38′ : 8·7, 8·7 : 195°·6 : 4″·9 : w.

Σ 1029. VII^h 3·0^m, S 4° 31′ : 7·4, 8·1 : 23°·4 : 2″·1 : v. w.

Σ 1030. VII^h 4·0^m, S 8° 31′ : 8, 9·2 : 42° : 15″·7 : ysh., o.

Σ 1034. VII^h 4·6^m, S 8° 9′ : 8·7, 9·2 : 17°·6 : 2″·5 : o.

Σ 1043. VII^h 7·5^m, S 0° 30′ : 8·8, 8·8 : 248°·3 : 2″·4 : w.

Σ 1045. VII^h 7·7^m, S 3° 0′ : 7·8, 9 : 226°·9 : 5″·9 : w., ash.

Σ 1052. VII^h 9·8^m, S 10° 6′ : 8·5, 8·7 : 20°·3 : 20″ : w.

Σ 1056. VII^h 10·5^m, S 1° 40′ : 7·8, 8·8 : 297°·9 : 4″ : ysh., blsh.

Σ 1077. VII^h 15·9^m, S 0° 29′ : 9·3, 9·3 : 322°·2 : 5″·4 : o.

Σ 1097. VII^h 23·2^m, S 11° 21′ : 6·5, 8·7 : 312°·1 : 20″·2 : y., blsh. Pale red, deep bl., '51. h. *comes*, β : 9·8 : 157°·2 : 23″·4. β doubles 6·5 : De., 6·3, 8·2 : 166°·5 : 0″·8, and sees another *comes* 12½, 41°·4 : 31″·1.

Σ 1111. VII^h 27·1^m, S 8° 28′ : 8·2, 8·7 : 219°·6 : 19″·8 : ysh., w.

Σ 1109. VII^h 27·3^m, S 0° 18′ : 8·8, 8·8, 11 : 15°·1, 303°·6 : 3″·4 : 27″·1 : w., w., o.

Σ 1132. VII^h 37·2^m, S 3° 17′ : 8·1, 8·7 : 237°·9 : 19″·3 : w.

Σ 1141. VII^h 41·9^m, N 0° 16′ : 8, 8·7 : 8°·9 : 17″·7 : w.; in pretty group.

Σ 1157. VII^h 49·5^m, S 2° 31′ : 8, 8 : 267°·3 : 1″·6 : w. Tarrant, 247°·1 : 1″·3, '87. A little *sp* is Σ 1154 : 7·7, 9·9 : 358° : 2″·3 : w., purpsh.; and further on, Σ 1152 : 8·2, 9·9 : 312°·9 : 5″·8 : y.

Σ 1183. VIII^h 1·6^m, S 8° 57′ : 5·5, 7·8 : 326°·3 : 31″ : yw., w.

29 (Σ 1190). VIII^h 3·6^m, S 2° 42′ : 6, 11·7 : 104°·2 : 31″·6 : y., o. 11·7 more like 10 or 11 to me, '51, '55, '56, '72 (9-in. spec.); De., 10. So Sa., '75. Gore, 3-in. achr.,

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'74; Fr., 11, '77. Yet h. and South missed it. Σ saw it in a 5-ft. instrument. Var.? An 8·5 : 244°·4 : 67″·1.

Σ 1233. VIIIʰ 23·4ᵐ, S 2° 11′ : 7·2, 11·5 : 331°·5 : 18″·2 ysh., o. Es., 11 var.? De., 10·4.

Σ 1264. VIIIʰ 37·4ᵐ, S 8° 3′ : 9, 9 : 269°·7 : 5″·8 : o.

31 (Hℏ. 303). VIIIʰ 38·7ᵐ, S 6° 52′ : β 5·5, 8·1 : 308°·8 : 78″·3. Webb, fine y., beautiful bl. β, faint star nearer at 335°.

Stars with Remarkable Spectra and Variables.

11 and 15 (S). See under Double Stars.

Es-Birm. 182. VIʰ 16·4ᵐ, S 11° 46′ : 6·8 : R. : III.? Pickering. Light bl. star near.

V (var.). VIʰ 17·7ᵐ, S 2° 9′ : 6·9 to 10·7 : Per., 333·5ᵈ. Schönfeld.

T (var.). VIʰ 19·8ᵐ, N 7° 8′ : 5·8–6·4 to 7·4–8·2 : Per., 27·0037ᵈ. Gould.

Es-Birm. 194. VIʰ 30·1ᵐ, S 1° 26′ : 8·3 : R. : III. Es.

Es-Birm. 195. VIʰ 30·8ᵐ, S 5° 18′ : 9·2 : R. : III. Es.

R (var.). VIʰ 33·7ᵐ, N 8° 49′ : 9·5 to 13 : irreg. Schm.

Es-Birm. 200. VIʰ 39·4ᵐ, N 3° 25′ : 9·3 : R. : IV. Pickering.

Es-Birm. 201. VIʰ 42·4ᵐ, N o° 48′ : 9·6 : remarkable R.: IV.? Es.

Es-Birm. 205. VIʰ 47·3ᵐ, S 7° 1′ : 8·8 : R. : IV. : splendid field. Es.

Es-Birm. 206. VIʰ 48·2ᵐ, S 4° 27′ : 9 : R. Holden. IV. Es.

Es-Birm. 208. VIʰ 53·0ᵐ, N 6° 18′ : 8 : R. : IV. Es.

Es-Birm. 211. VIʰ 56·0ᵐ, S 3° 7′ : 7·7 : R. : IV. Es.

Es-Birm. 216. VIIʰ 2·1ᵐ, S 7° 24′ : 8·3 : R. Bessel. IV. Es.

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Es-Birm. 219. VII^h 9·4^m, S 9° 5′ : 8·5 : R. Holden. III. Es.

Es-Birm. 230. VII^h 20·2^m, S 2° 57′ : 9 : R. : IV. Es.

U (var.). VII^h 26·0^m, S 9° 34′ : 5·9–7·3 to 6·6–8 : Per., 45·20^d. Gould. Type of R. Scuti. Es. var. spect.?

Es-Birm. 236. VII^h 26·7^m, N 0° 40′ : 8·2 : R. Bond. III. Es.

Clusters.

2232 (10). VI^h 23·0^m, S 4° 42′ : 6 pale y., the *lucida* of an elegant group, visible with naked eye. The Galaxy throughout this region well repays the trouble of sweeping.

2244 (H. VII 2). VI^h 27·0^m, N 4° 56′. Beautiful; visible to the naked eye; including 12, 6 m^s. y.; and many 7 and 8 m^s. stars. The smallest, 14 m^s., run in rays. Small pair near centre.

2301 (H. VI 27). VI^h 46·6^m, N 0° 35′. Bright Galaxy cl., resembling three arms of a cross.

2323 (M. 50). VI^h 58·1^m, S 8° 12′. Brilliant cl., straggling, h. says, to 30′; containing a red star; between Sirius and Procyon, $\frac{1}{3}$ nearer the former, in a superb neighbourhood, where the Creator has—

'Sowed with stars the heaven thick as a field.'[1]

2548 (H. VI 22). VIII^h 8·8^m, S 5° 30′. Group of pretty uniform 9 m^s. stars, with a profusion of lesser ones.

OPHIUCHUS.

An extensive region, somewhat barren to the eye, but attractive to the telescope.

[1] Milton.

[OPHIUCHUS]

Double Stars.

Σ 2033. XVI^h 13·0^m, S 2° 1′ : 8·5, 8·7 : 175°·6 : 10″·7 : v. w.

ρ (*Hh.* 512). XVI^h 19·6^m, S 23° 13′ : 6, 6 : 1°·9 : 4″·1, '34. Bin. β, 355° : 3″·4, '89. Pale y., tawny, '54. Finely grouped with two 8 m^s. stars, the most distant of which β doubles. 3° *n* a little *p* α Scorpii. h. on intensely black ground, in a great blank space.

Σ 2048. XVI^h 23·4^m, S 7° 54′ : 6·3, 9 : 302°·7 : 4″·7 : ysh., o. Sm. notes deep or. star in field.

λ (Σ 2055). XVI^h 25·9^m, N 2° 13′ : 4, 6·1 : 331°·8 : 0″·8 : y., blsh. Ha., 47°·6 : 1″·4, '91. Colours very discordant; Es., Fr., cols. var.? Sa., 2 faint *comites*. Bin. Per., 373·5 yrs. Glasenapp.

19 (Σ 2096). XVI^h 42·2^m, N 2° 14′ : 6, 9·3 : 92°·6 : 22″·2 : w., ash. Fine low-powered field.

21 (OΣ 315). XVI^h 46·3^m, N 1° 23′ : 6·2, 8·1 : 167°·4 : 0″·8, '42. Tarrant, 163°·5 : 1″·1, '85. In field with Σ 2105 : 8, 9·5 : 130°·4 : 29″·1. 8, 9 (Sm.'s scale), Sept. 11, '55. $3\frac{7}{10}$-in. achr. Σ's 9·5 would have been extremely minute, and certainly not rated 9 by me. De., 8·5, 9·7.

Σ 2106. XVI^h 46·3^m, N 9° 34′ : 6·7, 8·4 : 337°·5 : 1″ : w. Ha., 314°·6 : 0″·4, '86.

β 241. XVI^h 49·6^m, S 21° 24′ : 6·7, 6·8 : 343° : 0″·6, '81.

Σ 3106. XVI^h 50·4^m, S 5° 1′ : 8·6, 8·6 : 246°·6 : 2″·4 : o.

24 (β 1117). XVI^h 50·8^m, S 22° 59′ : 6·4, 6·5 : 264°·2 : 0″·7.

Σ 3107. XVI^h 53·8^m, N 4° 5′ : 8·5, 8·5 : 112°·3 : 1″·6 : w.

Σ 2114. XVI^h 57·2^m, N 8° 35′ : 6·2, 7·4 : 135°·7 : 1″·3 : w. Tarrant, 158°·4 : 1″·5, '87. Bin. In a line carried from ι through κ as far again.

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Σ 2122. XVII^h 1·7^m, S 1° 31′ : 6·5, 8·7 : 280°·5 : 20″·1 : w., o.

Σ 2123. XVII^h 2·1^m, N 6° 56′ : 8·5, 8·5 : 218°·4 : 19″·3 : w.

η (β 1118). XVII^h 4·6^m, S 15° 36′ : 3·4, 3·9 : 274°·7 : 0″·3.

h. 589. XVII^h 4·7^m, S 24° 49′ : β, 7·5, 7·8 : 302°·0 : 9″·9.

β 125. XVII^h 6·0^m, S 26° 55′ : 7·9, 10 : 61°·3 : 1″·5. 33 sec. *p.* 20′ *n.* is β 956 : 8, 9·7 : 163°·1 : 0″·6. (*sp.* 36.)

Σ 2132. XVII^h 7·5^m, S 3° 56′ : 8·3, 9 : 108° : 1″·5 : yw.

36. XVII^h 9·2^m, S 26° 27′ : 6, 6 : 43°·5 : 5″ : ′35. Ha., 197°·2 : 4″·3, ′88. Golden y., ′54. Bin. of perhaps 200 yrs.? and strange to say its rapid p.m., 1″·27 annually, is identical with that of 30 Scorp. more than 13′ distant, so as to lead to the impression that, in Sm.'s words, 'while in itself a singular revolving binary system, it is accompanying another and most distant object in an *annus magnus*, to contemplate the period of which makes imagination quail.' Fl. has found a corresponding movement in an intermediate star, 12 m^s. There is a distant 7·5 to which h. sees a minute *comes*. 2 min. *f* is 38, 6·5, 11 : 330°·4 : 6″·8.; Sm.

h. 307. XVII^h 11·5^m, N 1° 19′ : 5, 17 : β, 358°·8 : 20″·2.

39 (H*h.* 534). XVII^h 11·9^m, S 24° 11′ : 5½, 6 : 358°·3 : 15″, beautiful; vertical near meridian; pale orange, clear bl., ′54. Not very far distant, XVII^h 24·6^m, S 21° 24′, was the Great New Star, discovered by Möstlin, Kepler's scholar, 1604; at first surpassing Jupiter, and even rivalling Venus, but totally vanishing in 1½ yrs. Chacornac, ′61, mapped a 10 m^s. star, which was missed by some observers in ′71, recovered as 12 m^s. by Winnecke, ′75, and apparently var. See an admirable note and map in Gore's 'Southern Stellar Objects.'

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β 126. XVII^h 14·1^m, S 17° 39′ : De., 6·2, 7·5 : 261°·3 : 1″·7 : w., azure. *Comes*, 11·6 : 139°·7 : 11″·5.

Σ 2149. XVII^h 14·7^m, S 6° 20′ : 8·8, 8·8 : 23°·2 : 7″·5 : o.

Σ 2156. XVII^h 18·8^m, S 0° 45′ : 8·3, 9 : 32°·3 : 3″·3 : yw. Ha., 36°·1, '86.

Σ 2160. XVII^h 20·0^m, N 15° 43′ : 5·5, 10 : 61°·9 : 4″·1 : v. w., ash.

Σ 2159. XVII^h 20·3^m, N 13° 25′ : 7·4, 8·1 : 326°·4 : 26″·3 : w., pretty.

β 129. XVII^h 22·5^m, S 25° 26′ : 7·5, 8 : Cin., 100°·3 : 0″·9.

Σ 2166. XVII^h 23·2^m, N 11° 28′ : 5·6, 7·4 : 283°·2 : 27″·5 : w., blsh.

Σ 2171. XVII^h 23·8^m, S 9° 55′ : 7·5, 7·6 : 75°·7 : 1″·6 : yw. Tarrant, 65°·7, '87, Bin.

Σ 2170. XVII^h 24·0^m, N 10° 34′ : 8·5, 9 : 76°·3 : 3″·8 : ysh.

Σ 2173. XVII^h 25·3^m, S 0° 59′ : 5·8, 6·1 : 323°·8 : 0″·6 : v. yellow gold, '30. Ha., 160°·1 : 1″ : '91, Bin. Per. Du., 45·43 yrs.

Σ 2187. XVII^h 29·7^m, N 4° 10′ : 8·3, 9·3 : 177°·6 : 3″·1 : w.

54 (Σ 2184). XVII^h 29·8^m, N 13° 13′ : 6·3, 11·2 : 76°·8 : 21″·4 : y., o.

53 (Σ I 34). XVII^h 29·9^m, N 9° 39′ : 5·6, 7·3 : 191°·4 : 41″·1 : w., 7·3 decided bl., '50; 5·6 light y.; so Fr., '76.

Σ 2186. XVII^h 30·7^m, N 1° 4′ : 7·5, 7·5 : 82°·7 : 2″·9 : w.

Σ 2188. XVII^h 31·4^m, N 6° 41′ : 8·5, 9·2 : 203°·8 : 5″·5 : w.

Σ 2191. XVII^h 34·5^m, S 4° 55′ : 7, 8 : 268°·2 : 26″·5 : w.

β 1251. XVII^h 37·4^m, N 16° 0′ : 6, 11·5 : 79° : 1″·4.

Σ 2200. XVII^h 39·0^m, N 5° 54′ : 8, 8·8 : 168°·2 : 1″·7 : w.

61 (Σ 2202). XVII^h 39·6^m, N 2° 37′ : 5·5, 5·8 : 94°·1 : 20″·5 : w. W., greyish, *p* considerably the larger, '50; a

little larger, 9-in. spec., '71, '76, '80. De., 5·5, 6·2. Closely *p* γ, and 2° *s* from β, a fine specimen of a pale y. star.

Σ 2211. XVII^h 41·5^m, S 1° 10′ : 8·2, 9·2 : 115°·5 : 9″·7 : w.

Σ 2212. XVII^h 41·5^m, N 5° 44′ : 8·5, 8·8 : 341°·5 : 3″·1 : w.

Σ 2222. XVII^h 43·4^m, N 14° 51′ : 7·5, 9·2 : 58°·6 : 2″·1 : y., o.

Σ 2227. XVII^h 44·5^m, N 5° 21′ : 8·8, 8·8 : 296°·5 : 19″·6 : In a broad group 1½° *nf* β, evidently a *family*.

OΣ 338. XVII^h 47·4^m, N 15° 20′ : 6·6, 6·9 : 46° : 0″·7 : gold. Ha., 201°·1, '84.

Σ 2235. XVII^h 47·8^m, S 2° 15′ : 7·5, 9·1 : 123°·5 : 18″·4 : y., o.

Σ 2244. XVII^h 51·9^m, N 0° 5′ : 6·9, 7·1 : 272°·7 : 1″ : w.

Σ 2252. XVII^h 54·0^m, N 2° 3′ : 8, 8·3, : 22°·9 : 3″·8 : w.

Σ 2254. XVII^h 54·4^m, N 12° 27′ : 8·3, 8·7 : 266° : 3″·2 : v. w.

67 (H*h*. 551) XVII^h 55·7^m, N 2° 56′ : β 5·6, 9 : 143°·0 : 54″·7. β sees *comites* to both stars, 5, 14·8 : 195°·6 : 6″·8, and 8·3, 11·5 : 129°·6 : 8″·4. There is another *comes*, β 12 : 179°·8 : 45″·9. B. faint pair *sp*. At a short distance *p*, a little *s*, must be h.'s 'very fine or. star,' 7·5 m^s. 67, ysh., bl., '50.

68 (β 1125). XVII^h 56·7^m, N 1° 19′ : 5·1, 9·9 : 14°·9 : 1″.

τ (Σ 2262). XVII^h 57·7^m, S 8° 11′ : 5, 5·7, : 192°·9 : 0″·3 : ysh., '35. Ha., 253°·1 : 1″·7. Bin. Per., 217·87, Doberck.

OΣΣ 164. XVII^h 58·4^m, N 7° 56′ : De., 7·3, 8·2 : 2°·9 : 49″·8 : y.

Σ 2265. XVII^h 59·2^m, N 6° 28′ : 8·4, 9·4 : 282°·8 : 24″·5 : w.

70 (Σ 2272). XVIII^h 0·4^m, N 2° 32′ : 4·1, 6·1 : 148°·2 : 4″ : y., purple, '25. Ha., 327°·5 : 2″·2, '91. Y., orange, '50.

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Bin. Per., 87·84 yrs. Gore. The distance varies from 1″·7 to 6″·7 (Ha.). P. Sm. thinks, 6·1 var. in col. Fr., both y., '76. De., 6·1, generally red. Irregularities in motion have led to suspicion of a third invisible companion. h. observes that the rings around its telescopic image 'seem to have something peculiar. They are thin, and extend further than in general;' on another occasion, he remarks, in measuring it, 'Difficult, owing to the rings and appendages. N.B.—I always find this star difficult from the above cause.' 3 minute *comites*: 9-in. spec., '71.

Σ 2276. XVIII^h 1·1^m, N 12° 0′ : 6, 7 : 257°·9 : 6″·8 : yw., blsh., w. W., ruddy, not ½ m^s. difference, '50. Main, 8, 8, '61. Du., 6·4, 6·5, '68, '71. De., 6·3, 7·2.

72 (OΣ 342). XVIII^h 2·6^m, N 9° 33′ : 4, 8 : 154°·3 : 1″·2. Single in all later observations.

73 (Σ 2281). XVIII^h 4·6^m, N 3° 58′ : 5·7, 7·2 : 259°·7 : 1″·5 : w. Elong.? '50. Ha., 245°·4 : 0″·7, '86. Bin.

Σ 2283. XVIII^h 4·7^m, N 6° 8′ : 7·2, 7·7 : 92°·7 : 1″·2 : o.

Σ 2329. XVIII^h 26·6^m, N 6° 23′ : 7·7, 9 : 43°·3 : 4″·2 : w.

Σ 2342. XVIII^h 30·7^m, N 4° 52′ : 5·7, 8·5 : 12° : 26″·9 : w., o. *β comes* 12·7 : 336°·3 : 9″·3.

Σ 2346. XVIII^h 32·4^m, N 7° 27′ : 7·5, 9 : 282°·8 : 15″·4 : w., o. Widening; rectilinear motion.

Stars with Remarkable Spectra and Variables.

W (var.). XVI^h 16·0^m, S 7° 28′ : 8·9–9·5 below 13·5 : Per., 331·3^d. Schönfeld.

V (var.). XVI^h 21·2^m S 12° 12′ : 7–7·5 to 9·6–10·5 : Per. 304^d. IV. Dunér.

χ. XVI^h 21·2^m, S 18° 14′ : 4·6 : F., bright. At Harvard.

Es-Birm. 459. XVI^h 21·4^m, S 7° 22′ : 6·2 : y. : III. D'A.

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T (var.). XVI^{h} 28·0^{m}, S 15° 55′ : 10 below 12·5 : Per., 361^{d}. Pogson.

S (var.). XVI^{h} 28·5^{m}, S 16° 57′ : 8·3–9 below 13 : Per., 233·8^{d}. Pogson.

Es-Birm. 465. XVI^{h} 33·6^{m}. S 12° 7′ : 8 : R. Holden.

Es-Birm. 472. XVI^{h} 45·9^{m}, S 0° 18′ : 8 : R. Holden.

Nova. XVI^{h} 53·9^{m}, S 12° 45′ : Hind's New Star, about 3° *np*, *η*, 5 m^{s}., 1848, April 28,[1] which afterwards faded to 11 m^{s}., but may blaze out again; it was or., with flashes of red, a colour sometimes noticed in other stars. Sa. found colour very fine, '75.

R (var.). XVII^{h} 2·0^{m}, S 15° 58′ : 7–8·1 below 12 : Per., 302·9^{d}. Pogson.

U (var.). XVII^{h} 11·5^{m}, N 1° 19′ : 6 to 6·7 in 20^{h} 7^{m}, 42·56^{s} : Algol type. Gould.

Es-Birm. 486. XVII^{h} 14·7^{m}, S 2° 16′ : 7·0 : R. : III. D'A.

Es-Birm. 490. XVII^{h} 21·5^{m}, N 17° 0′ : 6·2 : yr. : III. Vogel.

Es-Birm. 492. XVII^{h} 23·8^{m}, S 19° 23′ : 7·8 : R. : h. IV. Du. Var. Es.

Es-Birm. 495. XVII^{h} 29·2^{m}, N 14° 55′ : 6·2 : yr. : III. Vogel.

Es-Birm. 497. XVII^{h} 29·4^{m}, N 12° 36′ : 8·2 : R. Webb. III.? Es.

Es-Birm. 501. XVII^{h} 39·1^{m}, S 18° 37′ : 8·5 : R. : h. IV. Dunér. Var.

Es-Birm. 502. XVII^{h} 39·0^{m}, N 4° 23′ : 8·1 : pale R. Webb. III.? Es.

[1] Airy rated it fully 5 m^{s}., May 9; 4 m ., May 10; sinking to 6 m^{s}., May 18.

[OPHIUCHUS]

Es-Birm. 503. XVII^h 42·5^m, S 3° 36′ : 8·5 : R. Holden. III. Du.

Es-Birm. 512. XVIII^h 2·5^m, N 6° 32′ : 7·5 : ry. : III. Vogel.

X (var.). XVIII^h 33·6^m, N 8° 45′ : 6·8 to 9 : Per., 354^d. Espin, '86.

Clusters and Nebulæ.

6171 (H. VI 40). XVI^h 26·9^m, S 12° 50′. Large pale cl., best with low power. Comparative desert *f*. See M. 19 *infra*, and a list of similar vacancies in App. I.

6218 (M. 12). XVI^h 42·0^m, S 1° 48′ : resolvable. h., 10–16 m^s. E. of Rosse, slightly spiral; finely grouped.

6254 (M. 10). XVI^h 51·9^m, S 3° 57′ : bright cl. h., 11–15 m^s. E. of Rosse, tendency to curved branches. A beautiful group lies *f*; *lucida* bright or.

6273 (M. 19). XVI^h 56·4^m, S 26° 7′. A mass of stars; large, fairly bright, but very low. Near the large blank space in the body of Scorpio, where H. found scarcely any stars.

6333 (M. 9). XVII^h 13·3^m, S 18° 25′. Small, apparently resolvable: 'a myriad of minute stars, clustering into a blaze in the centre, and wonderfully aggregated with numerous outliers' (Sm.). h., 14 m^s.

6402 (M. 14). XVII^h 32·3^m, S 3° 11′. Large; glimpses of resolution, effected by H. with 20-ft. refl. (h., 15 or 16 m^s., 'the finest star dust.')

6494 (M. 23). XVII^h 51·0^m, S 19° 0′. Grand low-power field. h., about 100 stars, 9–10 to 13 m^s. Announced by increasing number.

Fine region XVIII^h 1·1^m, N 4° 33′.

Curious sequence of small stars ± XVIII^h 7·8^m, N 4° 7′.

[OPHIUCHUS]

6572 (Σ 6). XVIII^h 7·2^m, N 6° 48′. Small, very bright. Considered by Σ one of the most curious objects in the heavens. h., slightly hazy. D'A., a little elliptical, 5″ or 6″, blsh. grn. Gaseous.

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The finest constellation in the heavens, equally remarkable for telescopic interest and obvious brilliancy; fortunately its position is very suitable for English observers, as it comes to the meridian in winter, and attains a sufficient but not an inconvenient altitude. Sweeping in many parts most beautiful.

α (Betelgeuze). V^h 49·8^m, N 7° 23′ is irregularly var. h., the discoverer, found it alternately above β (Rigel) and below α Tauri, from 1839, Nov. 26, to 1840, Jan. 7, losing nearly half its light; afterwards its changes were much less conspicuous till 1849. 1852, Dec. 5, Fletcher thought it brighter than Capella, which he rated clearly above Wega, so that it was then the brightest star in the N. hemisphere. He also saw it nearly approaching those stars, 1865, Dec. 25. When brightest Huggins and Miller find that a group of dark lines fades out of its spectrum, which is remarkable, like that of β Pegasi and others, for the *extreme faintness of the lines of hydrogen.* Huggins thinks it may be receding from us 22 miles per second. Lassell says of it, 'A most beautiful and brilliant gem! Singularly beautiful in colour, a rich topaz; in hue and brilliancy different from any other star I have seen.' Look at α and β alternately to appreciate the contrast. The spectrum is of Type III., but the bands under high dispersion are almost entirely resolved into innumerable

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fine lines. 20′ *s* a little *p* is Σ 817 : 8·2, 8·3 : 72°·4 : 18″·5 : w., certain y.

Double Stars.

Σ 589. IV^h 39·5^m, N 5° 7′ : 8, 8 : 310°·9 : 4″·5 : yw. Ha., 299°·9, '88. Beautiful.

Σ 609. IV^h 45·6^m, N 0° 59′ : 8·5, 8·7 : 82°·1 : 1″·9 : y.

Σ 612. IV^h 48·8^m, N 7° 14′ : 7·6, 7·9 : 196°·9 : 16″·6 : w.

Σ 614. IV^h 50·0^m, S 0° 42′ : 8·5, 8·9 : 68°·4 : 4″·1 : w.

Σ 622. IV^h 52·9^m, N 1° 31′ : 8·2, 8·2 : 179°·9 : 2″·6 : w. Ha., 353°·9, '88. Closely *sp* π^6.

Σ 620. IV^h 52·7^m, N 13° 48′ : 8·4, 9·4 : 226°·3 : 3″·6 : yw., o. Moving.

Σ 627. IV^h 55·3^m, N 3° 28′ : 6·3, 7 : 260°·3 : 21″·3 : w. Fr., nearly equal, '77; but De., 6, 7. A splendid pair.

Σ 630. IV^h 56·8^m, N 1° 28′ : 6·8, 8 : 49°·2 : 14″ : w., blsh. Se., 5·5, 7, '56. De., 6·3, 7·7. 1° *f* π^6.

14 (OΣ 98). V^h 2·5^m, N 8° 22′ : 6, 6·8 : 217°·9 : 1″·2. Ha., 188°·6 : 1″, '91. Bin. Wa., pair *n* a little *f*. Copeland, 11·2, 13·4 : 288°·4 : 10″·8. 6′ *s* is Σ 643 : 8·5, 8·5 : 295°·2 : 2″·7 : o.

Σ 652. V^h 6·6^m, N 0° 55′ : 6·3, 7·8 : 184°·3 : 1″·7 : yw.

ρ^1 (Σ 654). V^h 8·1^m, N 2° 45′ : 4·7, 8·5 : 63°·5 : 7″·1 : v. y., bl. 8·5 very small, '49, '56; so Sims, '76. Jacob 10, '56; so Main, '62. De., 4·5, 8·5. Ha., 5, 8.

OΣ 517. V^h 8·3^m, N 1° 52′ : 6·5, 6·7 : 280° : 0″·7. Ha., *comes* 13 : 138°·2 : 6″·9.

Σ 664. V^h 9·7^m, N 8° 20′ : 7·5, 8 : 167°·6 : 5″ : w.

β (Σ 668). V^h 9·7^m, S 8° 19′ : 1, 8 : 199°·8 : 9″·1 : yw., o. h. 8, pale red; so Kitchener. Es., bl. De., azure. I always see a blue tinge in the great star, resembling that of Wega. Sa., ysh. with reflector; blsh. achr., side by side.

Fletcher, y. Huggins supposes that it may be receding from us 15 or more miles a second. Beautiful object, and fair test for pretty good telescope; but from low altitude often blotted with vapour. B. has seen 8 distinctly with 4½-in. achr. just before sunset; and β and Fr. have detected it with 1½-in. T. T. Smith with 1½-in silv. spec. β and Sa. thought it elongated, but round in all later obs. Mitchel, another *comes*, β 1″·5 : 44″·5.

Σ 667. v^h 9·9^m, S 7° 12′ : 7·5, 9 : 312°·7 : 4″·2 : v. y., ash. With sweeping power, a pale ruby.

Σ 678. v^h 12·3^m, N 4° 36′ : 8·3, 8·8 : 96°·5 : 3″·3 : w.

τ (β 188). v^h 12·7^m, S 6° 57′ : 4, 11, 10·7 : 249°·2, 60°·0 : 5″·2, 36″. *Comes* to 11 : 11·6 : 51°·4 : 4″. Fine test. r. well seen 11¼-in. spec. Next large star *nf* β.

Σ 688. v^h 14·7^m, S 10° 51′ : 7, 7·4 : 274°·3 : 10″·5 : ysh., blsh. w.

Σ 692. v^h 15·6^m, S 8° 7′ : 7·8, 8·8 : 4°·2 : 34″·9 : ysh., w. Fine wide object. β divides 7·8 into 8, 8·1. De., 355°·3 : 0″·6.

Σ 693. v^h 16·6^m, S 2° 9′ : 8·7, 9 : 8°·9 : 3″·6 : w.

23 (Σ 696). v^h 17·6^m, N 3° 27′ : 5, 7 : 28°·1 : 31″·7 : grnsh. w., w. Pale y., fine bl., '49. Beautiful col.

Σ 701. v^h 18·5^m, S 8° 31′ : 6·7, 8·5 : 146° : 5″·9 : v. w., ash.

η (Dawes). v^h 19·4^m, S 2° 29′ : 4, 5 : 87° : 1″ : w., purpsh. Excellent test, but low. 5½-in. with 212 sometimes split it. Buffham divides it with 4½-in. of 9-in. spec. Fixed. B., 4 *comites*. β, faint pair *sf* 10, 10½ m^m. 12^s *f* 6′ *s* is β 556 : 7, 11·3 : 239°·2 : 0″·9.

Σ 708. v^h 20·0^m, N 1° 50′ : 8·2, 9·8 : 323°·1 : 2″·6 : w. ψ^1, *p* a little *s*, is in a fine field; about 50′ further *sp* two pairs, P V. 67 : or., bl.; and Σ 700 : 8, 8·2 : 5°·3 : 4″·5 : w. Fr., ysh., blsh., '77.

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Σ 710. v^h 20·5^m, S 11° 24′ : 8·2, 8·3 : 193°·6 : 10″·7 : w.

Σ 712. v^h 21·3^m, N 2° 51′ : 7, 9 : 45°·4 (54°·4?) : 3″·1 : v. w., o.

ψ^3 (Knott). v^h 21·6^m, N 3° 0′ : 5·5, 11 : 322°·3 : 2″·8 : y., fine bl. Well seen, β 3½-in. of 6-in. achr.; strangely missed by h., Σ, OΣ. In a grand region. Quadruple in line 1^m *f*.

h. 702. v^h 24·7^m, S 2° 2′ : 8, 9 : est. 230° : 20″. Secchi, pair in field. De., 8·5, 9 : 51°·3 : 5″·2. De., another, 8·5, 10 : 358°·6 : 15″·7, to which Es. adds another *comes*. Beautiful combination.

Σ 721. v^h 24·3^m, N 3° 5′ : 7, 9 : 150°·9 : 24″·2 : w., o. Fr., 9 blsh., or purple, '77. β doubles it : 9·5, 9·5 : 142°·5 : 0″·4.

31 (Σ 725). v^h 24·7^m, S 1° 10′ : 5·8, 11 : 87°·5 : 12″·7 : v. gold, o. Fr., 11 bl., '77, '79. 11 easy, 9⅓-in. spec. Sa., underrated, clear blue. Buffham, 2¼-in. of 9¼-in., refl. De., 10·5. Gould, 5·8 var.? 4¾-6? A. strongly suspects var. in 9 m^s. star 25^s *f*, 3′ 48″ *n*.

Σ 726. v^h 25·4^m, N 10° 10′ : 8, 8·5 : 261° : 1″·2 : w.

32 (Σ 728). v^h 25·4^m, N 5° 52′ : 5·2, 6·7 : 203°·7 : 1″ : ysh. β, 179°·2 : 0″·4, '89. Bin.?

33 (Σ 729). v^h 26·0^m, N 3° 13′ : 6, 7·3 : 25°·6 : 1″·9 : w. Tarrant 32°·8, '87.

Σ 731. v^h 26·3^m, S 2° 10′ : 8·5, 9 : 331°·6 : 4″·6 : w. Beautiful pair.

δ (Σ I 14). v^h 26·9^m, S 0° 23′ : 2, 6·8 : 359°·2 : 52″·7 : grnsh. w., w. Pale grn., pale violet or lilac, '49. Wy., pale lilac or violet, '55. Fr., pale y., fine bl., '77. h., 2 var. : 2·2? 2·7; of late no var. β, very minute *comes*, 14 : 226°·8 : 32″·4, *min. vis.* of 15-in. achr.

β 1048. v^h 27·7^m, S 1° 40″ : 6·2, 10·7 : 358°·2 : 2″·2

Σ 735. v^h 28·0^m, S 6° 34′ : 8·5, 9 : 355°·2 : 30″·9 : o.

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Σ 784. v^h 28·1^m, S 1° 47′ : 7, 8·6 : 356°·4 : 1″·8 : w., o. *comes* 8·6 : 243°·1 : 29″·3, is doubled by β; 8·7, 9·7 : 296°·1 : 0″·8.

λ (Σ 738). v^h 29·6^m, N 9° 52′ : 4, 6 : 40°·3 : 4″·2 : ysh., purple. A *comes* 12 m^s. (β 183°·1 : 28″·7) seen with 5½-in. Glimpsed by Wa., with 2⅞-in. achr., '75. Whole region very fine.

Σ 743. v^h 29·8^m, S 4° 27′ : 6·9, 8 : 277°·8 : 1″·8 : v. w. Fr., ysh., '77.

Σ 751. v^h 30·7^m, S 1° 3′ : 8, 8·7 : 123°·9 : 15″·5 : w. W., bl., '83, in field with ε.

Σ 747. v^h 30·3^m, S 6° 4′ : 5·6, 6·5 : 223°·1 : 36″ : ysh., ashy. Wa. sees *comes* 14 m^s. *f* 5·6 : 22 sec. *p*, is Σ 745 : 8·5, 8·7 : 346°·5 : 28″·6. In group of ι.

ι (Σ 752). v^h 30·5^m, S 5° 59′ : 3·2, 7·3 : 142°·2 : 11″·3 : yw., blsh. Sm., a *comes* 11 : 102°·8 : 48″·9. Field very fine. A glow with 5½-in. around this group, which E. of Rosse finds to occupy a singular dark opening encompassed by nebulous matter. Wa., very minute pair between two brighter stars *n* in field—a test.

Σ 750. v^h 30·6^m, S 4° 25′ : 6, 8 : 59°·2 : 4″·3 : w., ash. Curious triplet 9·75, 10, 10·25 ± v^h 31·7^m, N 0° 14′.

Σ 754. v^h 31·7^m, S 6° 7′ : 6·5, 9·7 : 287°·6 : 5″·2 : w., bl.

Σ 757. v^h 32·4^m, S 0° 18′ : 8, 8·2 : 239°·8 : 1″·7 : v. w., *f* is Σ 758 : 8·5, 9 : 297°·7 : 11″·1 : v. w., '31. De., 9 azure, certain, '57. Fr., blsh., '77. Star 8 m^s. *p*. Pretty group *n* a little *f* ε, pale green, which H. saw in large faint neb., but E of Rosse clear. Photos, however, show that this constellation is full of scattered nebulosity, and is probably one vast nebula.

σ (Σ 762). v^h 33·7^m, S 2° 39′ : 4·1, 10·3, 7·5, 7 : 236°·5 : 84°·5, 11″, 12″·9; 7·5 and 7 : 230°·8 : 30″·0 : white, 3 ash.,

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4·1 y., '51; 7·5, ruddy, '69; bl., '83, 9½-in. spec. De., 3·9, 9·5, 6·8, 6·3. The *comes p* escaped some of the first observers, very plain now. *β*, doubles large star: 4, 6 : 357° : 0″·3, '88. 349°·7 : 0″·2, '91. Rapid Bin. Beautiful little triangle *p*, Σ 761 : 7·9, 8·2, 8·7 : 201°·6 : 68″·1 ; 8·2 and 8·7 : 267°·8 : 8″·3 : all w. A smaller *comes*, and 2 minute stars between the groups. Wa. sees all with 2⅞-in. and has pointed out minute pair *n* of 4.

Σ 763. v^h $33{\cdot}8^m$, N 10° 12′ : 8·2, 8·8 : 320°·1 : 5″·8 : ysh., yw.

ζ (Σ 774). v^h $35{\cdot}8^m$, S 2° 0′ : 2, 5·7 : 153°·3 : 2″·3 : w., small star singularly missed by H., and discovered by Kunowsky, seems of some nondescript hue, about which observers do not agree. Σ uses a specially manufactured epithet 'olivacea subrubicunda.' Third star, *β*, 9·0 m^g. : 9°·3 : 57″·2.

Σ 790. v^h $41{\cdot}1^m$, S 4° 18′ : 7, 9·3 : 89°·1 : 6″·8 : rsh. y., bl.

Σ 792. v^h $41{\cdot}1^m$, S 3° 18′ : 8·2, 8·7 : 133°·9 : 24″·9 : ysh. Very pretty.

52 (Σ 795). v^h $42{\cdot}6^m$, N 6° 25′ : 6·2, 6·2 : 200°·1 : 1″·7 : ysh., pale ysh. Maw., 205°·8, '90. Bin? In contact, 80, neatly split, 144 : excellent test, readily found, about 2° *sp a*. Minute *comes* (Sa., 13 mag.) *n* a little *f*, 9½-in. spec.

Σ 798. v^h $43{\cdot}4^m$, S 8° 25′ : 7·2, 9·2 : 181°·4 : 20″·7 : v. w., o.

Σ 809. v^h $45{\cdot}6^m$, S 1° 27′ : 7·7, 8·8 : 101°·2 : 25″·7 : y., ash. *β* divides 7·7 : 7·9, 10·3 : 106°·0 : 1″·2.

Σ 813. v^h $47{\cdot}3^m$, N 18° 55′ : 8, 8 : 148°·1 : 3″·2 : v. w.

OΣ 123. v^h $48{\cdot}6^m$, N 10° 14′ : 7, 8·7 : 175°·9 : 2″·4 : y., ash.

Σ 816. v^h $49{\cdot}6^m$, N 5° 51 : 6·2, 8·7 : 289°·3 : 4″·2 : v. w., o.

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Σ 820. v^h $50^m.4$, N 8° 59′ : 8·3, 8·8 : 110°·3 : 4″·7 : o.

Σ 823. v^h $52^m.9$, S 7° 40′ : 8·5, 9·2 : 339°·3 : 7″·5 : w.

OΣ 124. v^h $53^m.2$, N 12° 49′ : 6, 7·8 : 309°·0 : o″·5, '45.

OΣ 125. v^h $53^m.6$, N 22° 28′ : 7, 8·5 : 357°·2 : 1″·5 : red.

Σ 826. v^h $53^m.8$, S 1° 20′ : 8·2, 9·2 : 115°·5 : 1″·8 : w. Angle increasing.

μ (β 1056). v^h $56^m.9$, N 9° 39′ : 4, 14 : 272° : 16″·8.

Σ 835. v^h $58^m.5$, N 18° 19′ : 8, 9 : 146°·6 : 2″·2 : yw., ash.

Σ 840. vi^h $0^m.9$, N 10° 47′ : 8·5, 8·7 : 183°·5 : o″·9 : o. Angle dimin. A 6·2 : 247°·2 : 21″·1 : yw.

Σ 853. vi^h $3^m.6$, N 11° 41′ : 7·8, 8·3 : 340°·1 : 24″·1 : w. Ha., 351°·1 : 27″·6, '85. P.m.

Σ 859. vi^h $4^m.3$, N 5° 40′ : 8, 8·5 : 249° : 31″·4 : yw. Widening from p.m.

Σ 855. vi^h $3^m.8$, N 2° 31′ : 5·8, 6·8 : 113°·2 : 29″·3 : w. A third star makes a beautiful group.

Σ 867. vi^h $5^m.8$, N 17° 24′ : 7, 8·5 : 156°·3 : 2″·2 : yw., w.

Σ 877. vi^h $9^m.0$, N 14° 38′ : 7·2, 7·7 : 263°·3 : 5″·3 : yw.

Σ 880. vi^h $9^m.9$, N 10° 37′ : 8, 8 : 53°·4 : 5″·4 : ysh.

Σ 895 (rej.). vi^h $15^m.5$, N 5° 47′ : 8–9, 11 : 59°·8 ± 40″. h., full ruby red, fine green by contrast: blsh., '78; so Fr., '79.

Stars with Remarkable Spectra and Variables.

α and δ see under Double Stars.

o^1 iv^h $46^m.9$, N 14° 5′ : 5 : III. Se.

R (var.). iv^h $53^m.6$, N 7° 59′ : 8·7–9·1 to 11·2–13·5 : Per., 380^d. Hind.

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Es-Birm. 111. IV^{h} $56{\cdot}4^{m}$, N 6° 30′ : 9·2 : R. : III. Pickering.

Es-Birm. 114. V^{h} $0{\cdot}2^{m}$, N 1° 2′ : 6 : R. Hist. Cél. IV. Se. Var. Es.

Es-Birm. 122. V^{h} $9{\cdot}5^{m}$, S 0° 41′ : 7 : pale R. Webb. III. D'A.

Es-Birm. 126. V^{h} $13{\cdot}2^{m}$, S 8° 20′ : 8 : pale R. Webb. III? Es.

Es-Birm. 131. V^{h} $18{\cdot}5^{m}$, S 9° 25′ : 8·6 : R. Schm. III? Es.

S (var.). V^{h} $24{\cdot}1^{m}$, S 4° 46′ : 8·3–9·5 to 11–13 : Per., 412^{d}. Webb.

Es-Birm. 142. V^{h} $27{\cdot}8^{m}$, N 7° 4′ : 8·2 : R. : IV. Es.

T (var.). V^{h} $30{\cdot}9^{m}$, S 5° 32′ : 9·7 to 13 : Irreg. In Neb. Bond.

Es-Birm. 157. V^{h} $41{\cdot}4^{m}$, S 5° 54′ : 9 : pale R. Webb.

Es-Birm. 161. V^{h} $48{\cdot}3^{m}$, N 7° 9′ : 9·4 : pale R. Webb.

U (var.). V^{h} $49{\cdot}9^{m}$, N 20° 10′ : 6·4–7·5 : below 12 : Per., 371^{d}. Gore.

Star. V^{h} $59{\cdot}4^{m}$, S 6° 42′ : 5·8 : *F* bright. At Harvard.

Es-Birm. 181. VI^{h} $14{\cdot}4^{m}$, N 14° 42′ : 5·8 : pale or. : B. III. Vogel.

Clusters and Nebulæ.

Group. Three pairs in field ± 1° p π^{2} ± IV^{h} $45{\cdot}1^{m}$, N 8° 44′.

Pretty field ± V^{h} 19^{m}, N 1° 43′.

1976 (M. 42). V^{h} $30{\cdot}4^{m}$, S 5° 27′. The GREAT NEBULA IN ORION, one of the most wonderful objects in the heavens; readily visible to the naked eye, yet strangely missed, as Humboldt says, by Galileo, who paid great attention to Orion. Cysatus compared it telescopically with the

comet of 1618. The telescope shows an irregular branching mass of greenish haze, in some directions moderately well defined where the dark sky penetrates it in deep openings: in others melting imperceptibly away over such an extent that Se., by moving his telescope rapidly to gain full contrast, has traced it in singular convolutions, and with a considerable break near σ through $5\frac{1}{2}^\circ$ of Decl., and 4° of RA.—from ζ to 49, and probably H. V 38—a prodigious diffusion. Bond II also found it encompassed by a distant nebulous loop; and in various parts detected about 20 curved wreaths, indicating somewhat of a spiral structure. Its real nature was long a profound mystery. It resisted H's 40-ft. refl., in which it was one of the first objects viewed, and, together with the Andromeda, suggested to him the widely discussed Nebula Hypothesis, which would see here an unformed fiery mist, the chaotic material of future suns. h. found but the aspect of 'a curdling liquid, or a surface strewed over with flocks of wool, or the breaking up of a mackerel sky.' The E. of Rosse, with his 3-ft. refl., La., with his 2-ft. spec. in the Maltese sky, could advance no further; it was long believed that the 6-ft. mirror of the E. of Rosse had lifted the veil, and distinguished in some places its starry composition; Bond, too, arrived at the same conclusion; and Se. with smaller, but very perfect means, thought he could detect the glittering 'star dust.' Yet, though this would imply a permanent form, there were strange discrepancies in the drawings of the best hands. h., in England, the same observer at the Cape of Good Hope, Bond, La., Liapounov with a $9\frac{1}{2}$-in. achr. at Kazan, OΣ, at Poulkova, all differ in various ways; the latter even believed that the brightness of the central part was in a state of continual variation: and the subsequently published

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labours of Rosse, La., and Se., are far from correspondent in detail.[1] All this is strange; and the spectrum analysis of Huggins has only added to the wonder by exhibiting it as a mass of incandescent gases.[2] In the densest part, four stars, 6, 7, 7·5, 8 m^{s}. form a trapezium known as θ Orionis. Sm. gives their colours pale w., faint lilac, garnet, reddish. β and Gore have seen them with 1½-in. Σ., in 1826, discovered a fifth star, which is believed to have become visible only of late years; perhaps it may be brightening, as it has been seen with $3\frac{8}{10}$-in., and, it has been said, even with $2\frac{7}{8}$-in. Bond's 15-in. achr. has shown it in full daylight. E. of Rosse sees it very red. h. added a 6th still smaller near the brightest star, 1830, Feb. 13, with South's $11\frac{3}{4}$-in. achr. Both have been thought var. β has seen both with 3-in.; T. T. Smith with 3 in. of silvered mirror. Two or three other most minute points have occasionally been detected, which, however, the Chicago and Washington achrs. failed to show. A. G. Clark, however, added a 7th within the trapezium, with the 36-in. achr., at the Lick Observatory, and Barnard has caught another, and has found a minute and difficult pair just outside. β gives the following positions for the stars.

[1] The photographic plate will in time show whether any part is variable. With lenses of short focus the nebula seems on the plates to extend over the greater part of the constellation.

[2] Here and in H. IV 18, Androm., he sees a 4th line, and in the photo spectrum there are many others. Several nebulæ show but one, probably through their faintness. The words of Seneca, aptly quoted by Humboldt, are applicable to these mysterious objects: 'Rerum natura sacra sua non simul tradit. Initiatos nos credimus; in vestibulo ejus hæremus. Illa arcana non promiscue nec omnibus patent, reducta et in interiore sacrario clausa sunt: ex quibus aliud hæc ætas, aliud quæ post nos subibit, dispiciet. Tarde magna proveniunt.'

[ORION]

A B, 32°·3 : 8″·7. A C, 131°·3 : 12″·9. D C, 240°·6 : 13″·3. A E (Σ star), 351°·5 : 4″·3. C F (h.'s star), 120°·9 : 4″. D G (Clark's star), 270°·5 : 7″·0. Barnard's star could not be measured, but his star, A H, 178°·4 : 7″·9, which is double 16, 16·5 : 274° : 1″·3, of which β says, 'It is infinitely more difficult than any double star I have ever attempted to see or measure.' OΣ thinks that several involved stars are subject to change, and remarks that 'the existence of so many variable stars on such a small space in the central part of the most curious nebula in the heavens must of course induce us to suppose these phænomena intimately connected with the mysterious nature of that body.' A considerable aperture will show how beautifully one large star, nearly opposite the great dark opening, is encompassed by a spiral mass of haze. Clear weather must of course be chosen, and the lowest power which will bring out the trapezium, is most likely to give a satisfactory contrast with the exterior darkness.

1981 (h. 362). v^h 30·6^m, S 4° 25. Brilliant field, containing Σ 750 and Σ 743, *supra*. A grand neighbourhood; sweep well over the whole space, from 42 to ι, which star large apertures involve in haze, connected by a long faint loop with the Great Nebula.

2022 (H. IV 34). v^h 36·6^m, N 9° 2′. Small, distinct, faint, blsh., plan. Gas.

2024 (H. V 28). v^h 36·8^m, S 1° 54′. Faint, but extensive neb. immediately f ζ; D'A., 4 large patches. 2 with 9½ in spec.

2068 (M. 78). v^h 41·6^m, N 0° 1′. Singular 'wispy,' neb., easily found by sweeping 14^m f δ, 20′ n. Best defined n, E. of Rosse spiral? D'A., 6′ or 7′, enclosing pair β, 9·5, 9·5 : 201°·8 : 50″·7. Sm., 8·5, 9; stars much smaller, '50,

[ORION]

'56, '64. D'A., 9, 10, '55; 10, 10, '64. Fr., 11, 12, '79. β, n star double, 9, 11·5 : 85°·3 : 1″. h., 3rd star. D'A., var. 12–14? 4^m p, 3′ s is Σ 782 : 7·8, 8·3 : 309°·4 : 36″·2 : w.

2169 (H. VIII 24). 6^h $2{\cdot}8^m$, N 13° 58′. Triangular cl., containing Σ 848 : 7·5, 8·5 : 2″·4 : lucid w., 1° s of ν. 'These gatherings, occurring indifferently upon the *Via Lactea* and off it, awaken still more our admiration of the stupendous richness of the Universe, in every department of which there appears such a profusion of creation, if we may so express ourselves of the works of the ALMIGHTY, in which our utmost ken has yet never detected any redundancy, much less anything made in vain' (Sm.).

PEGASUS.

A constellation easily recognized by the great square[1] which three of its principal stars form with that in the head of Andromeda.

Double Stars.

Σ 3061. 0^h $0{\cdot}6^m$, N 17° 17′ : 8, 8 : 148°·4 : 7″·6 : w. 14′ n is Σ 3060 : 8·5, 8·5 : 110°·5 : 3″·9 : ysh.

Σ 2767. 21^h $5{\cdot}9^m$, N 19° 33′ : 7·8, 8·2 : 30°·6 : 2″·5 : v. w. 1 (Σ II 11). 21^h $17{\cdot}5^m$, N 19° 23′ : 4·5, 8·6 : 311°·2 : 36″·2 : v. y., o. Or., bl., '49. 4.5, var? C.p.m. P. Sm., *comes*, 14·5 : 22°·6 : 80″·7.

Σ 2797. 21^h $21{\cdot}9^m$, N 13° 15′ : 6·7, 8·2 : 213°·3 : 3″·2 : v. w., ash.

Σ 2799. 21^h $24{\cdot}0^m$, N 10° 39′ : 6·6, 6·6 : 332°·9 : 1″·4 : ysh. Tarrant, 125°·3, '87. Beautiful.

[1] Within this area, A.'s *Uran. Nova* contains barely 30 naked-eye stars. Schm. in the sky of Athens counted 102.

[PEGASUS]

Σ 2804. XXI^h 28·4^m, N 20° 16′ : 7·3, 8 : 316°·9 : 2″·9 : w. Ha., 330°·6, '86. Very beautiful.

3 (Σ I 56). XXI^h 32·7^m, N 6° 10′ : 6, 7·4 : 349°·4 : 39″·1 : w. W., pale bl., '50. P. Sm. thinks col. of 7·4 var. De., 5·5, 6·8. A pretty pair in field; OΣ 443 : 8, 8·3. De., 8·9, 9·2 : 349°·3 : 7″·9 : w.

OΣ 445. XXI^h 34·7^m, N 20° 16′ : 8, 8·5 : 113°·1 : 0″·8.

ε. XXI^h 39·2^m, N 9° 25′ : 2·5, β, 11·5, 8·8 : 325°·2, 321°·4 : 81″·4, 140″·3. Pale y., o., bl., '47. This object, when near the meridian, will exhibit a phænomenon, noticed by h.—the pendulum-like oscillation of a small star in the same vertical with a large one, when the telescope is swung from side to side. This, he thinks, is due to the longer time required for a fainter light to affect the retina, so that the reversal of motion is first perceived in the brighter object. I have seen this strikingly in δ and ζ Orion., and δ Herc.

κ (Σ 2824). XXI^h 40·2^m, N 25° 11′ : 3·9, 10·8 : 308°·5 : 11″ : ysh., o. Ha., 300° : 12″·1, '88. De., *comes*, var.? β in '80, divided 3·9 into 4·8, 5·3, one of the most rapid Bin., 11 yrs.? 144°·6 : 0″·1, '91.

Σ 2828. XXI^h 44·5^m, N 2° 56′ : 8, 9 : 142°·5 : 23″·8 : w. Ha., 133°·1 : 26″·6, '88. *Comes* to 9, 9·2 : 37° : 3″·6

Σ 2829. XXI^h 45·0^n, N 30° 17′ : 8·2, 8·9 : 15°·6 : 17″·1 : w.

Σ 2841. XXI^h 49·6^m, N 19° 14′ : 6·5, 8 : 111° : 22″·2 : v. y., bl.

OΣ 452. XXI^h 50·6^m, N 6° 46′ : 7·7, 8·8 : 179°·1 : 1″·2.

Σ 2848. XXI^h 53·0^m, N 5° 28′ : 7·2, 7·5 : 54°·9 : 10″·4 : w., ysh. or red. '*Colores indubii*,' '29. D., v. w., '41. De., w., '63, '70. Fr. as Σ, '76. Vogel, both yw.: spect. I., '80. Heis, naked-eye star.

[PEGASUS]

Σ 2854. xxi^h $59{\cdot}5^m$, N 13° 10′ : 7·7, 8 : 83°·1 : 3″·1 : w.

Σ 2857. $xxii^h$ $1{\cdot}2^m$, N 9° 36′ : 7, 8·7 : 113°·8 : 19″·5 : w., ash.

Σ 2861. $xxii^h$ $1{\cdot}3^m$, N 20° 19′ : 7·7, 8·2 : 219°·9 : 7″·1 : w.

Σ 2868. $xxii^h$ $4{\cdot}7^m$, N 22° 3′ : 8·3, 8·8 : 5°·1 : 1″·1 : w.

π^1 $xxii^h$ $4{\cdot}8^m$, N 32° 41′ : 5 : forms a grand pair with π^2, 4 m^s. Sm., 2 distant *comites*. β, 3rd more minute.

Σ 2867. $xxii^h$ $5{\cdot}1^m$, N 7° 27′ : 7·9, 9 : 208°·1 : 10″·5 : ysh., blsh.

Σ 2869. $xxii^h$ $5{\cdot}5^m$, N 14° 8′ : 5·8, 11·8 : 253°·7 : 22″·7 : v. y., o.

Σ 2877. $xxii^h$ $9{\cdot}5^m$, N 16° 42′ : 6·4, 9·6 : 316°·4 : 7″·6 : y., bl. Perr. : 355°·5 : 10″·7, '85.

Σ 2878. $xxii^h$ $9{\cdot}5^m$, N 7° 28′ : 6·5, 8 : 130°·8 : 1″·4 : w. Ferrari, 7, 8 : y., bl., 'belles couleurs.' Moving? β, 126°, '91. Wa., faint star *np*.

Σ 2881. $xxii^h$ $10{\cdot}0^m$, N 29° 3′ : 7·7, 8·2 : 111°·4 : 1″·8 : ysh., blsh. w. Ha., 102°·6 : 1″·6, '85.

30 (h. 962). $xxii^h$ $15{\cdot}5^m$, N 5° 17′ : β 6, 11·8, 12·3 : 20°·7, 222°·8 : 6″·3, 10″·1.

33 (Σ 2900). $xxii^h$ $18{\cdot}8^m$, N 20° 20′ : 6, 9·2 : 180°·7 : 2″·5 : y., o. Ha., 177°·8 : 1″·7, '88. Bin.? Third star, 7·9 : 343°·0 : 56″·6 : w. Ha., 327°·3 : 64″·6, '88. From p.m.

Σ 2901. $xxii^h$ $19{\cdot}4^m$, N 3° 19′ : 8·5, 9·1 : 147°·1 : 2″·8 : w.

34 (β 290). $xxii^h$ $21{\cdot}5^m$, N 3° 53′ : 5·8, 11·7 : 218°·7 : 2″·7.

Σ 2905. $xxii^h$ $22{\cdot}3^m$, N 14° 38′ : 8·5, 8·5 : 283°·8 : 3″·3 : w.

Σ 2908. $xxii^h$ $23{\cdot}3^m$, N 16° 45′ : 7, 8·7 : 116°·3 : 8″·9 : y. w., o.

[PEGASUS]

Σ 2910. XXII^h 23·5^m, N 23° 1′ : 8·3, 8·8 : 347°·2 : 5″·3 : w. Ha., 341°·5, '88.

37 (Σ 2912). XXII^h 24·9^m, N 3° 56′ : 5·8, 7·2 : 112°·6 : 1″·2 : w., '31. *β*, 130°·0 : 0″·3, '78. Elongated? 36-in., '91. Bin.

Σ 2915. XXII^h 27·6^m, N 6° 54′ : 8·5, 8·7 : 169° : 12″·3 : w.

Σ 2920. XXII^h 29·5^m, N 3° 41′ : 7·1, 8·2 : 144° : 13″·6 : w.

Σ 3134. XXII^h 36·0^m, N 29° 29′ : 9, 9·3 : 76°·2 : 6″·1 : 0.

Σ 2934. XXII^h 37·1^m, N 20° 55′ : 8·2, 9·2 : 187°·8 : 1″·2, yw., w. Ha., 156°·2 : 1″, '87. Bin.?

η (H*h*. 775). XXII^h 38·3^m, N 29° 42′ : 3, has, like *ε*, a blsh. 10 m^s. *comes*, but the large star is pale y. Schm. thinks its tint var., more or less red in different years. *β*, *comes* double, 10·1, 10·1 : 83°·3 : 0″·3.

ξ (h. 301). XXII^h 41·6^m, N 11° 40′ : De., 4, 12 : 117°·7 : 12″·2, '66. *β*, 112°·6 : 11″·9, '79.

Σ 2945. XXII^h 45·0^m, N 30° 47′ : 8·5, 8·5 : 292°·6 : 3″·9 : w.

Σ 2952. (rej.). XXII^h 49·4^m, N 27° 29′ : 7·5, 10 : w., bl. Es., 132°·4 : 18″·3.

Σ 2954. XXII^h 49·8^m, N 14° 39′ : 9, 9 : 28°·6 : 36″·7 : 0.

52 (OΣ 483). XXII^h 54·2^m, N 11° 12′ : 6·2, 7·7 : 196°·1 : 1″·2 : w., r. Ha., 215°·8, '88. Bin.

Σ 2974. XXIII^h 0·2^m, N 32° 50′ : 8, 8 : 159°·7 : 2″·8 : v. w.

Σ 2978. XXIII^h 2·7^m, N 32° 17′ : 6·8, 8 : 146°·2 : 8″·4 : w., blsh. Several little pairs similar to each other lie dispersed in this region.

57 (Σ 2982). XXIII^h 4·5^m, N 8° 8′ : 5·9, 10·2 : 198°·1 : 32″·6, gold, o. III Type, Spectrum.

h. 3176. XXIII^h 7·9^m, N 12° 1′ : 9, 9. Insulated.

Σ 2990. XXIII^h 8·4^m, N 21° 33′ : 8·5, 8·5 : 69°·1 : 1″·6 : w.

[PEGASUS]

Σ 2991 (rej.). XXIII^h 8·4^m, N 10° 31′ : 6, 10 : y., bl.

Σ 2997. XXIII^h 12·1^m, N 20° 52′ : 8·5, 9 : 223°·1 : 24″·4 : w.

Σ 3000. XXIII^h 13·8^m, N 24° 40′ : 8·7, 8·8 : 52°·3 : 3″·2 : w.

OΣ 494. XXIII^h 15·8^m, N 21° 25′ : 7·4, 8·1 : 83°·6 : 3″·3 : blsh. w.

Σ 3006. XXIII^h 16·4^m, N 34° 54′ : 8·5, 9 : 182°·8 : 4″·6 : w. Ha., 170°·1 : 5″·4, '85.

64 (β 718). XXIII^h 17·0^m, N 31° 16′ : 5½, 7½ : 86°·9 : 0″·5.

Σ 3007. XXIII^h 17·8^m, N 20° 1′ : 6·5, 9·5 : 79°·2 : 5″·7 : w., o.

Σ 3013. XXIII^h 22·6^m, N 16° 5′ : 7·8, 9·3 : 270° : 2″·6 w., o. At 52″·1, is Σ 3012 : 8·7, 8·8 : 190°·8 : 2″·6 : w.

OΣ 497. XXIII^h 25·8^m, N 8° 56′ : 7·9, 8·6 : 213°·1 : 1″·3.

Σ 3021. XXIII^h 26·4^m, N 15° 40′ : 7·7, 8·9 : 308°·9 : 8″·3 : w., ashy.

72 (β 720). XXIII^h 29·0^m, N 30° 47′ : 6, 6 : 127°·7 : 0″·4, '78. 329°·5 : 0″·3, '91.

OΣ 503. XXIII^h 37·0^m, N 19° 46′ : 7·2, 7·8 : 132°·6 : 1″·8, blsh. w.

78 (A. G. Clark). XXIII^h 39·0^m, N 28° 49′ : β, 5, 8·1 : 191°·8 : 1″·6, '78. 197°, '89. Bin.?

Σ 3041. XXIII^h 42·7^m, N 16° 31′ : 8·1, 8·2 : 183°·4 : 3″·3 : w. Ha., 1°·5, '87. Third star, 7·3 : 347°·6 : 71″·1 : w. Ha., 350°·5 : 67″·3, '87.

Σ 3044. XXIII^h 47·9^m, N 11° 22′ : 6·9, 7·3 : 282°·1 : 18″·6 : v. w. W., pale bl., '50–1, not quite alike, '56. Σ found the diff. of m^{ss}. vary a whole m^s. The period of this change should be investigated. De., 6·3, 7.

85 (β 733). XXIII^h 56·8^m, N 26° 34′ : 6, 11·2 : 274° : 0″·7,

[PEGASUS]

'78. 139° : 0″·8, '90. Large p.m. Rapid bin. Schæberle, 22·3 yrs. A 9 m^{s}. at 33°·6 : 14″·4, '77, is being rapidly left behind; 354°·7 : 24″·6, '91.

Stars with Remarkable Spectra and Variables.

2. XXI^{h} 25·4^{m}, N 23° 12′ : 4·5 : or. : III. D'A.

7. XXI^{h} 37·2^{m}, N 5° 13′ : 5·8 : ry. : III. Vogel.

Es-Birm. 721. XXI^{h} 55·2^{m}, N 23° 27′ : Σ 2850 (7·2, 11·2 : 263°·3 : 2″·8), rsh. gold. III. Es.

Es-Birm. 722. XXI^{h} 59·5^{m}, N 27° 51′ : 7·7. Ruddy or. : h. III. D'A.

T (var.). XXII^{h} 4·0^{m}, N 12° 3′ : 8·5–9·3 below 13 : Per., 373^{d}. Hind.

Es-Birm. 726. XXII^{h} 12·5^{m}, N 4° 39′ : 7·8 : R. Lamont. III. Es.

β (var.). XXII^{h} 58·9^{m}, N 27° 32′ : 2·2 to 2·7 : Irreg. Schm. III Type.

R (var.). XXIII^{h} 1·6^{m}, N 10° 0′ : 6·9–7·9 below 13 : Per., 380·0^{d}. Hind.

55. XXIII^{h} 2·0^{m}, N 8° 52′ : 5·2 : III. Se.

S (var.). XXIII^{h} 15·5^{m}, N 8° 22′ : 7·3–8 below 13 : Per., 317·5^{d}. Marth.

71. XXIII^{h} 28·5^{m}, N 21° 57′ : 6 : rsh. : III. D'A.

77. XXIII^{h} 38·3^{m}, N 9° 46′ : 5 : R. B. III. D'A.

Cluster and Group.

7078 (M. 15). XXI^{h} 25·1^{m}, N 11° 43′. Bright and resolvable (h. 15 m^{s}.), blazing in centre; a glorious object with 9½-in. 'With' mirror. Very fine specimen of a completely insulated cl., discovered by Miraldi, 1745.

[PEGASUS]

Buffham, with 9-in. spec. finds a dark patch near the middle, with 2 faint dark 'lanes' or rifts, like those in M. 13, unnoticed by h. or D'A.

Bright group, ± $21^h\ 52^m$, N 7° 9'.

PERSEUS.

Here again we enter upon one of the most splendid portions of the Galaxy. Night after night the telescope might be employed in sweeping over its magnificent crowds of stars, among which many beautiful pairs, with the aspect of connection, would be found. This constellation includes the most conspicuous of, at least, the regularly variable stars, β, or Algol ($3^h\ 1{\cdot}6^m$, N 40° 34'), which changes in a few seconds less than $2^d.\ 20^h.\ 49^m.$, the increase and decrease together occupying not more than 7^h, the minimum only $18^m.$; so that it usually appears 2 m^s. Pickering has shown theoretically that the variation is due to a dark companion, and Vogel has found displacement in the lines of the spectrum showing the revolution of a dark and bright star round their common centre of gravity. Schr. discovered, 1787, a *comes*, sometimes invisible. β, 192°·5 : 81″·9, who adds a faint *comes* to this: 10, 12·5 : 114°·6 : 10″·5, and finds two fainter and closer *comites* to Algol at 155°·3; 144°·6 : 58″·7 : 67″·7.

Double Stars.

Σ 213. $2^h\ 2{\cdot}6^m$, N 50° 36' : 8·5, 9 : 320° : 1″·9 : 0.

5 (β 874). $2^h\ 4{\cdot}6^m$, N 57° 11' : 6·3, 12·5 : 273°·6 : 5″·6.

Σ 235. $2^h\ 10{\cdot}0^m$, N 55° 26' : 8·5, 9 : 43°·4 : 1″·7 : yw. Angle increasing.

[PERSEUS]

9 (β 875). 11^h $13{\cdot}8^m$, N 55° 27′ : 5·5, 12·3 : 162°·0 : 11″·6.

Σ 249. 11^h $15{\cdot}2^m$, N 44° 9′ : 7, 9 : 194°·7 : 2″·3 : v. w., ash. Angle decreasing?

Σ 260. 11^h $19{\cdot}5^m$, N 53° 50′ : 8·2, 8·7 : 348°·1 : 6″·6 : w.

Σ 268. 11^h $22{\cdot}3^m$, N 55° 5′ : 6·9, 8·2 : 129°·1 : 2″·7 : w., bl.

Σ 272. 11^h $25{\cdot}8^m$, N 58° 1′ : 8·2, 8·2 : 42°·3 : 1″·7 : v. w.

Σ 279. 11^h $29{\cdot}5^m$, N 36° 46′ : 6, 11 : 71°·2 : 16″·9 : gold, o.

OΣ 44. 11^h $35{\cdot}8^m$, N 42° 15′ : 7·8, 8·5 : 58°·6 : 1″·5 : blsh.

12. 11^h $35{\cdot}9^m$, N 39° 46′ : 6 : y., has 2 pairs near it in large field; one Σ 292 : 7·5, 8·2 : 210°·7 : 23″·1 : w.

β 521. 11^h $36{\cdot}2^m$, N 47° 50′ : 6·2, 11·2 : 153°·7 : 5″·9.

θ (Σ 296). 11^h $37{\cdot}3^m$, N 48° 48′ : 4·2, 10 : 294°·6 : 15″·4 : y., o. Ha., 299°·3 : 17″·1. β, third star, 9·6 : 218°·4 : 69″·2.

Σ 297. 11^h $38{\cdot}1^m$, N 56° 8′ : 8, 8·3 : 276°·6 : 15″·6 : w. β, *comes* : 10·6 : 106°·8 : 28″·3.

Σ 301. 11^h $40{\cdot}5^m$, N 53° 31′ : 7·3, 8·3 : 16°·6 : 8″·2 : ysh., blsh.

β 9. 11^h $40{\cdot}9^m$, N 35° 9′. De., 6·3, 8·7 : 160°·6 : 1″·5 : w., azure.

η (Σ 307). 11^h $43{\cdot}4^m$, N 55° 29′ : 4, 8·5 : 300°·4 : 28″·0 : v. y., v. bl. Barlow, β, Wa., 5 faint *comites;* Wa. and β one double : 5″·2.

Σ 314. 11^h $45{\cdot}7^m$, N 52° 35′ : 6·9, 7·1 : 295°·4 : 1″·5 : w. Ha., 301°·8, '89.

Σ 316. 11^h $45{\cdot}8^m$, N 36° 53′ : 8·5, 8·7 : 134°·3 : 13″·9 : w.

20 (Σ 318). 11^h $47{\cdot}4^m$, N 37° 56′ : 5·5, 10 : 236°·8 : 14″·1 : yw., o. 'Neat test object' (Sm.) which $3\frac{7}{10}$-in. showed readily, and Gore saw with 3-in. achr. De., 5·2, 9·2. β divided 5·5 into 6, 7 : 158°·7 : 0″·3, '78. 281°·7 : 0″·1, '91. Bin. Next f 16, 5 m^s.

[PERSEUS]

Σ 331. $11^h\ 53{\cdot}7^m$, N 51° 56′ : 5·3, 6·7 : 85° : 12″·2 : w., blsh. Visible to naked eye, forming triangle with γ and τ.

Σ 336. $11^h\ 55{\cdot}4^m$, N 32° 1′ : 6·5, 8 : 8°·6 : 8″·2 : y., bl.

Σ 360. $111^h\ 5{\cdot}8^m$, N 36° 50′ : 7·8, 8 : 146°·4 : 1″·3 : ysh. Ha., 137°·2 : 1″·8, '88.

OΣ 51. $111^h\ 6{\cdot}2^m$, 43° 55′ : 7·9, 8·1 : 300° : 1″·4.

Σ 364. $111^h\ 7{\cdot}1^m$, N 38° 46′ : 8·5, 8·5 : 310°·5 : 11″·4 : w.

Σ 369. $111^h\ 10{\cdot}6^m$, N 40° 7′ : 6·5, 7·8 : 28°·8 : 3″·3 : yw., blsh. w.

P. III 28. $111^h\ 14{\cdot}7^m$, N 48° 43′, near α, *s* a little *p* : 6 : or., has fine bl. companion in beautiful field.

Σ 382. $111^h\ 18{\cdot}2^m$, N 33° 11′ : 7, 10·5 : 154°·5 : 3″·6 : y., o. 7 var.? De., 5, 6, 7, 7·5. β, 6.

34 (β 1179). $111^h\ 22{\cdot}2^m$, N 49° 10′ : 5·9, 11·6 : 163°·4 : 0″·7.

Σ 391. $111^h\ 22{\cdot}4^m$, N 44° 42′ : 7·3, 8 : 94°·8 : 3″·8 : w., purpsh.

Σ 413. $111^h\ 29{\cdot}1^m$, N 33° 21′ : 8·5, 8·5 : 130°·3 : 2″·5 : w.

β 533. $111^h\ 29{\cdot}4^m$, N 31° 21′ : 7, 7 : 149°·3 : 0″·4.

OΣ 59. $111^h\ 33{\cdot}7^m$, N 45° 42′ : 7·5, 7·8 : 349°·5 : 2″·4 : rsh.

Σ 425. $111^h\ 33{\cdot}8^m$, N 33° 47′ : 7·3, 7·3 : 104°·6 : 2″·9 : v. w. Es., 91°·9 : 2″·3, '92.

Σ 426. $111^h\ 34{\cdot}2^m$, N 38° 48′ : 7, 8·5 : 340°·6 : 19″·7 : w.

o (Σ 431). $111^h\ 36{\cdot}0^m$, N 33° 39′ : 4·2, 9·5 : 237°·2 : 20″ : grnsh. w., o.

β 1182. $111^h\ 36{\cdot}9^m$, N 48° 13′ : 6·4, 14·2, 13·5 : 261°·2, 242°·6 : 4″·4, 19″·3.

Σ 434. $111^h\ 37{\cdot}4^m$, N 38° 4′ : 7, 7·8 : 88°·2 : 28″·3 : gold, blsh. Optical.

38 (β 533). $111^h\ 38{\cdot}0^m$, N 31° 59′ : 4, 8·5 : 60°·5 : 1″.

Σ 439. $111^h\ 38{\cdot}3^m$, N 31° 51′ : 8, 9·2 : 38°·1 : 23″·2 : ysh., o. β divides 8 : 8·4, 8·4 : 354°·7 : 0″·5.

[PERSEUS]

β 1183. III^h 39·0^m, N 45° 22′ : 6·3, 14·7 : 139°·9 : 6″·5.

Σ 443. III^h 40·1^m, N 41° 11′ : 8·2, 8·8 : 44°·3 : 9″·1 : w. 2nd star nearly *s* of *ν*, ± 1°.

Σ 447. III^h 41·4^m, N 38° 3′ : 7·8, 9 : 178°·3 : 26″·5 : y., o. Separating.

Σ 446. III^h 41·9^m, N 52° 21′ : 7, 9·2 : 252°·7 : 8″·5 : yw., o. Es., *comes* 12·5 : 42°·7 : 11″·6. In cl.

ζ (Σ 464). III^h 47·8^m, N 31° 35′ : 2·7, 9·3 : 207°·6 : 12″·5 : grnsh. w., ash. Three other *comites*, *β*, 11·1, 9·3, 10 . 286°·6, 198°·0, 185°·1 : 32″·6, 89″·1, 119″·5. The attendants seemed to me, 1850, to increase their size with their distance; 9·3, however, might have been overpowered by 2·7. So Hunt, '61. H. appears also to have found but 3; can one be var.? 11·1 quite obvious with 9½-in. spec. Wa. and Sa., several others within 2′.

ϵ (Σ 471). III^h 51·1^m, N 39° 43′ : 3·1, 8·3 : 9°·2 : 8″·8 : grn., blsh. w. W., bl., '50. 8·3 very small, '49, several times, once with Bishop's 7-in. achr.; so my 5½-in., '63, and Sa., '74. De., 9, 8, 7·5. Fr., not small, '77.

Σ 476. III^h 54·9^m, N 38° 24′ : 7·5, 8·7 : 283°·8 : 17″·6 : y., bl. Widening.

Σ 477. III^h 55·2^m, N 41° 35′ : 8·3, 9·3 : 213°·4 : 3″ : w., o.

OΣ 531. IV^h 0·9^m, N 37° 49′ : 6·5, 8·2 : 147°·9 : 3″·3 : y., r., '55. *β*, 134°·3 : 2″·2, '91.

Σ 500. IV^h 4·9^m, N 40° 1′ : 8·5, 9·5 : 79° : 3″·9 : yw.

μ (OΣ 73). IV^h 7·5^m, N 48° 9′ : 4·5, 12 : 349°·2 : 15″·1.

Σ 512. IV^h 8·6^m, N 45° 10′ : 8·3, 8·3 : 225°·9 : 5″·2 : w.

OΣΣ 47. IV^h 12·9^m, N 50° 1′ : De., 6·5, 7·2 : 327°·4 : 74″·6 : gold red, w. Es., *comes* 10·5 : 257° : 21″·7. 8′ *n* a little *f* is a fine pair, Σ 519 rej., Es., 7·5, 9 : 345°·8 : 18″·5 : orange, bl.

Σ 533. IV^h 17·9^m, N 34° 5′ : 6, 7·5 : 60°·3 : 19″·6 : w., '31.

[PERSEUS]

De., pale r., pale bl., certain, '57. Fr., 7·5, blsh., '77. In a grand field with 55, 6 m^s.

56 (OΣ 81). IV^h 18·1^m, N 33° 44′ : 6, 8·8 : 53° : 4″·5 : y., o.

Σ 552. IV^h 24·5^m, N 39° 48′ : 6·3, 6·5 : 114°·4 : 9″ : v. w.

57 (OΣΣ 50). IV^h 26·4^m, N 42° 51′ : De., 5·2, 6·2 : 198°·9 : 113″·7 : y., w. Ysh., pale lilac, '52. Fr., 0·5 m^s. diff.; ysh., blsh., '77.

58. IV^h 29·7^m, N 41° 4′ : 5·5 : Or. has Σ 563 in field; 8, 9·7 : 29°·8 : 11″·7 : yw., o. Another pair, 10, 11, *sp.*

Σ 565. IV^h 31·0^m, N 41° 54′ : 7·2, 8·5 : 180°·3 : 1″·6 : ysh., blsh.

Stars with Remarkable Spectra and Variables.

Star. I^h 38·7^m, N 53° 28′ : 9·4 : IV. At Harvard.

U (var.). I^h 53·0^m, N 54° 20′ : 8·2 below 11. Unknown. At Harvard.

Var. I^h 55·1^m, N 56° 15′ : unknown. At Harvard.

Es-Birm. 39. I^h 56·4^m, N 54° 45′ : 7·9 : R. : h. III. Es.

T (var.). II^h 12·2^m, N 58° 29′ : 8·2 to 9·3 : Irregular. Safarik.

S (var.). II^h 15·7^m, N 58° 8′ : 8·5 to 13 : Irregular. Krueger.

Es-Birm. 53. II^h 31·2^m, N 56° 37′ : 9·3 : R. : h. III. Es.

Star. II^h 33·9^m, N 56° 18′ : 9·1 : Type V. At Harvard.

Es-Birm. 57. II^h 43·3^m, N 56° 34′ : 9·4 : R. Pickering. III or IV. Dunér. III. Var. Es.

Es-Birm. 58. II^h 43·6^m, N 57° 26′ : 8·9 : R. Holden. IV. Dunér.

Star. II^h 44·8^m, N 56° 31′ : 9·5 : Type V. At Harvard.

[PERSEUS]

ρ (var.). $11^h\ 58{\cdot}8^m$, N 38° 27′ : 3·4 to 4·2 : Irregular. Schm. III.

Es-Birm. 64. $III^h\ 3{\cdot}7^m$, N 57° 31′ : 7·9 : R. : IV. Pickering.

Es-Birm. 66. $III^h\ 6{\cdot}7^m$, N 47° 27′ : 9 : R. : IV. Es.

Es-Birm. 72. $III^h\ 22{\cdot}6^m$, N 55° 3′ : 7·5 : R. Webb. III? Es.

R (var.). $III^h\ 23{\cdot}7^m$, N 35° 20′ : 7·7–9·2 to 12·8–13·5 : Per., $210{\cdot}1^d$. Schönfeld.

Es-Birm. 77. $III^h\ 38{\cdot}5^m$, N 53° 35′ : 8 : R. : h. III. Es.

Es-Birm. 82. $IV^h\ 6{\cdot}6^m$, N 32° 16′ : 6·5 : R. B. III. Es.

Es-Birm. 82*a*. $IV^h\ 7{\cdot}4^m$, N 49° 14′ : 8·8 : R. : Bands. Es.

Es-Birm. 96. $IV^h\ 38{\cdot}8^m$, N 32° 46′ : 8·7 : R. h. III. Es.

Nebula and Clusters.

650, 651 (M. 76 and H. I 193). $1^h\ 36{\cdot}0^m$, N 51° 4′. Pearly wh. neb., double; curious miniature of M. 27, and like it *gaseous*, *p* a little the brighter. E. of Rosse, spiral.

869, 884 (H. VI 33, 34). $11^h\ 13{\cdot}7^m$, N 56° 40′. These two gorgeous clusters, described by Sm. as 'affording together one of the most brilliant telescopic objects in the heavens,' are visible to the naked eye as a protuberant part of the Galaxy, and so H. considers them. They are often called *The sword-hand of Perseus*. With 64 these superb masses were visible together, as well as a bright part *n*. $5\frac{1}{2}$-in. showed a red star between them. Sm. mentions a ruby and a garnet in 884. $9\frac{1}{3}$-in. shows 5 stars in all. T. T. Smith sees 8. Es. sees 9 in the cl. and outliers, all

[PERSEUS]

very similar in col., and spectrum (faint III type), and believes 869 nebulous. The red stars are all associated with 884. Follow the curve of stars *n*, which leads into a glorious region at $11^h\ 6^m$, N 58° 55′.

Beautiful field, $11^h\ 14^m$, 54°.

957 (h. 227). $11^h\ 26{\cdot}3^m$, N 57° 5′. Wide cl., h. 13–15 m^s., a little *f* 869.

Group. $11^h\ 29{\cdot}7^m$, N 55° 28′ : with reddish star. Es.

1039 (M. 34). $11^h\ 35{\cdot}6^m$, N 42° 21′. Just perceptible to naked eye; very grand low-power field, one of the finest objects of its class. It contains a little 8 m^s. pair 20″ apart.

1245 (H. VI 25). $12^h\ 7{\cdot}8^m$, N 46° 53′. A low power shows a very faint large cloud of minute stars (h. 12–15 m^s.), beautifully bordered by a brighter foreshortened pentagon.

1528 (H. VII 61). $17^h\ 7{\cdot}6^m$, N 50° 59′. Bright cl., good low-power object; larger stars in curves. E. of Rosse, 9½ m^s., red 30′ *df*, another 2′ *f*.

PISCES.

A dull region, containing some good telescopic objects.

Double Stars.

34 (Σ 5). $0^h\ 4{\cdot}9^m$, N 10° 36′ : 6, 10·5 : 162°·8 : 8″ : v. w., o.

35 (Σ 12). $0^h\ 9{\cdot}9^m$, N 8° 16′ : 6·2, 7·8 : 149°·9 : 11″·5 : w. W., bluish, '48. M^s. very differently given. De., 5·8, 7·2.

38 (Σ 22). $0^h\ 12{\cdot}3^m$, N 8° 19′ : 7, 8 : 236°·7 : 4″·7 : ysh., w. Σ, c.p.m. De., 6·5, 7·2.

Σ 25. $0^h\ 13{\cdot}5^m$, N 15° 26′ : 8·5, 8·5 : 192°·7 : 1″·7 : o.

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42 (Σ 27). 0^h $17{\cdot}2^m$, N 12° 57′ : 6·8, 10·7 : 344° : 31″·7 : v. y., o. 10·7 too small for col., 9-in. spec., '71. h., 7, 9 : or., bl., '27. Sa., bright grn., '74. De., 6·6, 11. Ha., 334°·9 : 29″·5, '86.

51 (Σ 36). 0^h $27{\cdot}3^m$, N 6° 25′ : 5, 9 : 82°·3 : 27″·4 : w., ash. W., blsh., '50.

52 (h. 1982). 0^h $27{\cdot}3^m$, N 19° 45′ : β, 5·8, 11·4 : 305°·7 : 38″·3. 11·4 easy 9-in. spec., '71.

55 (Σ 46). 0^h $34{\cdot}6^m$, N 20° 54′ : 5, 8·2 : 192°·7 : 6″·4 : v. y., v. bl. 8·2 very small, col. indistinct, '48, '50; 10 m^s. 9-in. spec., '71. Fr., like 10, '76; yet De., 8·2.

65 (Σ 61). 0^h $44{\cdot}5^m$, N 27° 10′ : 6, 6 : 299° : 4″·4 : ysh. De., 6·1, 6·4.

β 496. 0^h $46{\cdot}3^m$, N 12° 14′ : 6·5, 12·5 : 2° : 5″·1.

66 (OΣ 20). 0^h $49{\cdot}3^m$, N 18° 38′ : 5·9, 7 : 60°·4 : 0″·8 : ysh., blsh., '61. β, 341° : 0″·4, '91.

Σ 74. 0^h $49{\cdot}5^m$, N 8° 53′ : 8, 9 : 301°·9 : 3″ : w.

Σ 80. 0^h $54{\cdot}3^m$, N 0° 15′ : 7, 8·2 : 300°·1 : 18″·3 : y., bl. R., fine bl., '50. Ha., 314°·9 : 20″·6, '85.

Σ 82. 0^h $55{\cdot}5^m$, N 8° 56′ : 8·3, 9·3 : 303°·8 : 1″·7 : o.

Σ 87. 1^h $0{\cdot}2^m$, N 14° 51′ : 8·5, 8·5 : 193° : 6″·6 : ysh.

ψ^1 (Σ 88). 1^h $0{\cdot}4^m$, N 20° 56′ : 4·9, 5 : 160°·3 : 29″·9 : w. h., 11 m^s. star *f*. Fr., 2-in., '77.

77 (Σ 90). 1^h $0{\cdot}7^m$, N 4° 22′ : 5·9, 6·8 : 82°·7 : 32″·8 : w. W., blsh., '50.

Σ 98. 1^h $7{\cdot}3^m$, N 31° 33′ : 7, 8 : 247°·9 : 19″·3 : w.

φ (Σ 99). 1^h $8{\cdot}3$, N 24° 3′ : 4·7, 10·1 : 227°·5 : 8″ : v. y., bl. 10·1 missed, '50, '51. P., *duplex; comes* var.?

ζ (Σ 100). 1^h $8{\cdot}5^m$, N 7° 3′ : 4·2, 5·3 : 63°·7 : 23″·5 : w. W., greyish, '50. Ysh., pale lilac or rose, '53. Du., both pale y., '69. 4·2 var.? 4·2 to 6. Σ and Main, c.p.m.. β sees *comes* to 5·3, 11 : 248°·7 : 0″·9.

[PISCES]

ρ. 1h 20·9m, N 18° 39′ : and 94, both 5 ms., form a splendid pair.

Σ 122. 1h 21·7m, N 3° 1′ : 7·9, 9 : 332°·8 : 5″·8 : v. w., bl.

OΣΣ 9. 1h 23·1m, N 7° 26′ : De., 7·3, 7·8 : β, 98°·8 : 69″·3. Rosy and bluish, '50.

Σ 129. 1h 24·8m, N 12° 8′ : 8·5, 9 : 283°·2 : 8″·4 : w.

η (β 506). 1h 26·2m, N 14° 50′ : 4, 11 : 12°·9 : 1″.

100 (Σ 136). 1h 29·6m, N 12° 3′ : 6·9, 8 : 78°·8 : 16″ : w. W., bl., '50. Fletcher, y., lilac, '52. Fr., ruddy, '76.

Σ 138. 1h 30·8m, N 7° 8′ : 7·3, 7·3 : 20° : 1″·5 : yw. Ha., 34°·4, '87; 'no motion since '76.' Fine test, requiring beautiful weather; elong. 80; in contact 144; divided 250. Washington achr. *comes* 14 (Σ) : 62°·8 : 22″·2. Between μ and o; but there are several similar stars around; look in finder for a long narrow trapezium; it will be the p of the two s stars; in the telescope a 10 ms. star lies near it *nf*; fainter *comes sp.*

Σ 142. 1h 34·5m, N 14° 45′ : 8·2, 8·4 : 311°·6 : 26″·1 : ysh. Distance diminishing from p.m.

103 (β 5). 1h 33·9m, N 16° 8′ : 7, 9 : 297°·3 : 1″·3.

Σ 146. 1h 36·0m, N 9° 36′ : 8·3, 8·3 : 306°·5 : 23″·8 : w.

Σ 155. 1h 38·9m, N 8° 59′ : 7·5, 7·9 : 332°·8 : 4″·6 : w. D. vars. A little *np*, *o*. Beautiful field. β finds Ll. 3170 *np* double : 8·5, 9 : 98°·7 : 0″·9.

Σ 186. 1h 50·7m, N 1° 21′ : 7·2, 7·2 : 64°·7 : 1″·2. w. β, 232°·7 : 0″·3, '91. Bin.

α (Σ 202). 1h 56·9m, N 2° 17′ : 2·8, 3·9 : 335°·7 : 3″·6 : grnsh. w., bl., '32. Maw, 321°·4 : 3″, '89. Bin. I found the contrast certain, but 3·9 troublesome as to col., usually ruddy or tawny, sometimes bl. Pale y., brown y., 'quite satisfactory' : $3\frac{7}{10}$-in., '55. Pale y., tawny or fawn col., 'certain,' $5\frac{1}{2}$-in., '60. 3·9 blsh. ? ? 'no strong contrast,' '62.

[PISCES]

Brownish, at first fancied blsh.; 9-in. spec., '71. Both m^m. very variously given; but Fl. remarks with always about 1 m^s. diff. De., 4·1, 5·4.

2 (Barnard). $xxii^h$ $54{\cdot}3^m$, N 0° 26′ : β, 6, 13·4 : 92°·6 : 3″·3.

Σ 3009. $xxiii^h$ $19{\cdot}2^m$, N 3° 10′ : 6·8, 8·8 : 229°·5 : 6″·9 : v. y., bl.

κ^1, κ^2. $xxiii^h$ $21{\cdot}8^m$, N 0° 42′ : 5, 6 : fine field, containing 2 minute rubies (not seen, Es.). W. C. Bruce.

Σ 3019. $xxiii^h$ $25{\cdot}6^m$, N 4° 42′ : 7·1, 8·1 : 185°·3 : 10″·7 : w.

Σ 3030. $xxiii^h$ $35{\cdot}6^m$, S 0° 56′ : 8·4, 8·6 : 220°·8 : 2″·5 : w.

Σ 3031. $xxiii^h$ $36{\cdot}1^m$, N 5° 42′ : 7·5, 8·5 : 312°·9 : 14″·6 : w.

Σ 3033. $xxiii^h$ $38{\cdot}8^m$, N 6° 40′ : 8·5, 8·5 : 9°·9 : 3″·3 : v. w.

27 (β 730). $xxiii^h$ $53{\cdot}6^m$, S 4° 7′ : 5½, 10 : 265°·8 : 1″·4.

Σ 3054. $xxiii^h$ $57{\cdot}9^m$, N 7° 42′ : 7·5, 8·5 : 181°·5 : 33″·7 : v. w.

Stars with Remarkable Spectra and Variables.

Es-Birm. 5. 0^h $15{\cdot}0^m$, N 2° 29′ : ? : R. : Bands : var.? Pickering.

47. 0^h $22{\cdot}8^m$, N 17° 20′ : 5·4 : or. : III. D'A.

T (var.). 0^h $26{\cdot}8^m$, N 14° 3′ : 9·5–10 to 10·5–11. Irreg. Luther.

57. 0^h $41{\cdot}3^m$, N 14° 56′ : 5 : III. D'A.

S (var.). 1^h $12{\cdot}3^m$, N 8° 24′ : 8·2–9·3 to 14·7. Per., $405{\cdot}3^d$. Hind.

U (var.). 1^h $17{\cdot}7^m$, N 12° 21′ : 9·5 to 14·5–15. Per., $172{\cdot}7^d$. Peters.

[PISCES]

R (var.). $1^h\ 25{\cdot}5^m$, N 2° 22′ : 7–8·8 below 13. Per., $344{\cdot}15^d$. Hind.

19 (Es-Birm. 756). $\text{XXIII}^h\ 41{\cdot}3^m$, N 2° 56′ : 6·2 : R. : IV type. Se. Magnificent object. Var., according to Gould, but Chandler believes the apparent var. is due to the red col. Es., however, saw a well-marked max. $5{\cdot}2\ m^s$., 1884, Aug. 19, and places it as leader of a class of variables whose characteristics are spectrum. IV type. Var. about $1\ m^s$. Per. irregular. These stars for long intervals are nearly constant in light, and then for a short time rise to a max. Probably all the stars of type IV are subject to these fluctuations. In estimating magnitude of red stars it is well to put them out of focus, and thus compare *discs* of light instead of *points*. A binocular is a capital instrument for comparing together the magnitudes of the brighter stars.

30. $\text{XXIII}^h\ 56{\cdot}8^m$, S 6° 34′ : 5·0 : yr. : III. Du.

Nebula.

524. (H. I 151). $1^h\ 19{\cdot}5^m$, N 9° 1′. Round, brighter centre; 4 stars near.

SAGITTA.

A little asterism, of much greater antiquity than might have been supposed from its size and the smallness of its components. Sweeping here magnificent; few coloured stars.

Double Stars.

Σ 2484. $\text{XIX}^h\ 9{\cdot}9^m$, N 18° 53′ : 7·4, 8·9 : 218°·4 : 2″·5 : yw., o. Perr., 226°·3, '86.

2, 3 (Σ I 41). $\text{XIX}^h\ 19{\cdot}8^m$, N 16° 45′ : 5·9, 6·7 : v. w., form a wide pair.

[SAGITTA]

ϵ (OΣΣ 185). XIX^h 32·8^m, N 16° 14′. De., 5·6, 7·8 : yellow gold, o. Pale y., fine bl., '50.

H*h*. 630. XIX^h 35·0^m, N 16° 23′ : 8·7, 10 : est. 315° 20″ : fine ruby, fine bl. 5^m. 16^s. *f* 11′ *n* is Σ 2569 : 8, 8·5 : 2°·3 : 2″·4 : w.

ζ (Σ 2585). XIX^h 44·5^m, N 18° 53′ : 5·7, 8·8 : 312°·8 : 8″·5 : grnsh. w., bl. C.p.m. A. G. C. divided 5. β, 6, 6 : 157°·6 : 0″·3, '78. 182°·8 : 0″·1, '91. Bin. 9 has been thought var. in col. P. Sm., *comes* : 15 : 251° : 71″.

χ (H*h*. 655). XIX^h 55·5^m, N 17° 14′ : β, 6, 12 : 205°·4 : 28″·9, or., is *lucida* of a beautiful group containing smaller red star, and pretty little 10 m^s. pair. 6 is a fine III type star.

15. XIX^h 59·7^m, N 16° 48′ : 6 m^s. commands another fine group. *n* a little *p*, at a few minutes' distance is P. XIX. 392, 7 m^s. beautiful sapph. bl.

Σ 2622. XIX^h 59·6^m, N 16° 43′ : 8, 8·7 : 194°·2 : 6″.

η XX^h 0·7^m, N 19° 42′ : 5½ m^s. y., lies in a rich region. A circle round it of 30′ or 40′ radius will include several very pretty little 8 or 9 m^s. pairs, on different sides.

θ (Σ 2637). XX^h 5·5^m, N 20° 37′ : 6, 8·3, 7·1 : 326°·7, 226°·6 : 11″·4, 70″·7 : yw., ash, y. W., blsh., reddish, '47.

Stars with Remarkable Spectra and Variables.

Es-Birm. 598. XIX^h 17·2^m, N 17° 28′ : 9·5 : yr. : Vogel. III. Du. Var. 8·3–9·4. Es.

δ XIX^h 42·9^m, N 18° 17′ : 4 : III. Vogel.

S (10) var. XIX^h 51·4^m, N 16° 22′ : 5·6 to 6·4. Per., 8^d. 9^h. 11^m. Gore.

Es-Birm. 639*a*. XIX^h 58·9^m, N 20° 48′ : 9·4 : R. : IV. Es.

[SAGITTA]

Es-Birm. 643. xx^h $0{\cdot}7^m$, N 20° 22′ : 8·9 : R. : Pechüle. IV. Var.? Es.

R (var.). xx^h $9{\cdot}5^m$, N 16° 25′ : 8·5–8·7 to 9·8–10·4. Per., $70{\cdot}52^d$., with double max, like β Lyræ. Baxendell.

Cluster.

6838. (M. 71). xix^h $49{\cdot}3^m$, N 18° 31′. Large and dim, hazy to low powers with $3\frac{7}{10}$-in., yielding a cloud of faint stars (h. 11–16 m^s.) to higher magnifiers; interesting specimen of the process of nebular resolution. In Galaxy, rather more than 1° *sp* γ. About 1° *sp* M. 71 is a beautiful low-power field, containing pair, and triple group, all about 8 or 9 m^s.

SAGITTARIUS.

The stars of this constellation have a beautiful effect above the S. horizon, near the place where the Galaxy passes from sight in one latitude; but they are apt to be obscured by haze. The Milky Way is here very rich in a transparent night, but we see only the N. edge of a splendid portion of it.

Double Stars.

β 283. $xvii^h$ $55{\cdot}8^m$, S 22° 46′ : 6·5, 12·5 : 239°·3 : 8″.

μ^1 (h. 2822). $xviii^h$ $7{\cdot}8^m$, S 21° 5′. β, $3\frac{1}{2}$, 11, 9·5, 9·5 : 257°·7, 312°·1, 115°·4 : 16″·7, 48″·3, 50″·1. β sees a minuter *comes* : 118°·7 : 25″·2.

16 (β 286). $xviii^h$ $9{\cdot}3^m$, S 20° 25′ : 6, 12 : 216° : 6″.

21 (A. C. 10). $xviii^h$ $19{\cdot}4^m$, S 20° 35′. D., 5, $8\frac{1}{4}$: 292°·7 : 2″·5, ′53. Closing?

About $1\frac{1}{4}$° *s* of λ, $xviii^h$ $21{\cdot}8^m$, S 25° 28′ is a fine 7 m^s. triangle with *comites* to the *s* and *f* stars.

[SAGITTARIUS]

ν^2 (β 1033). XVIII^h 48·1^m, S 22° 52′ : 5·5, 11 : 104° : 1″·4.

h. 5112. XIX^h 17·7^m, S 18° 12′ : 8, 8, 8, 12. β and Gore 12 not seen. Nearly equilateral with ρ^1 and ρ^2.

52 (β 654). XIX^h 30·6^m, S 25° 6′ : 5, 10·8 : 160°·8 : 2″·9.

Σ 2565. XIX^h 39·7^m, S 13° 29′ : 8·8, 8·8 : 34°·1 : 5″·4 : w.

h. 2904. XIX^h 48·3^m, S 24° 11′. β, 6·6, 10·2 : 137°·6 : 17″·5. Distance diminishing.

Stars with Remarkable Spectra and Variables.

X (var.). XVII^h 41·3^m, S 27° 48′ : 4 to 6 : Per., 7·01185^d. Schm.

Star XVII^h 57·7^m, S 24° 22′ : 6·1 : *F* bright. At Harvard.

W (var.). XVII^h 58·6^m, S 29° 35′ : 4·8 to 5·8 : Per., 7·5946^d. Schm.

Star XVIII^h 2·1^m, S 19° 25′ : 9·6. Type V. At Harvard.

Es-Birm. 513. XVIII^h 4·0^m, S 15° 18′ : 8·3 : R. D'A. Bands. Es.

Es-Birm. 518. XVIII^h 7·2^m, S 18° 59′ : 9 : orange red. Holden.

Es-Birm. 519. XVIII^h 7·8^m, S 19° 16′ : 8·7 : R. Holden.

Es-Birm. 520. XVIII^h 7·9^m, S 19° 7′ : 8·8 : R. Holden.

Es-Birm. 523. XVIII^h 9·6^m, S 18° 58′ : 8·7 : orange red. Holden. III? Es.

Es-Birm. 524. XVIII^h 9·7^m, S 20° 0′ : 9·1 : R. Holden.

Es-Birm. 526. XVIII^h 12·5^m, S 18° 18′ : 8 : R. Holden. III? Es.

Es-Birm. 530. XVIII^h 15·4^m, S 24° 58′ : 6·5 : R. Holden. Var. At Cordoba.

Y (var.). XVIII^h 15·5^m, S 18° 54′ : 5·8 to 6·6 : Per., 5·7732^d. Sawyer.

[SAGITTARIUS]

Es-Birm. 535. XVIII^h 22·2^m, S 21° 18′ : 8·7 : R. Holden.

Es-Birm. 537. XVIII^h 25·5^m, S 21° 19′ : 8·5 : R. Holden.

Es-Birm. 539. XVIII^h 25·6^m, S 17° 29′ : 10 : R. Holden.

U (var.). XVIII^h 26·0^m, S 19° 12′ : 7 to 8·3 : Per., 6·7446^d. Schm.

Es-Birm. 557. XVIII^h 37·0^m, S 19° 23′ : 6·5 : R. Holden. III. Es.

Es-Birm. 582. XVIII^h 57·7^m, S 22° 52′ : 8·5 : R. Holden.

T (var.). XIX^h 10·5^m, S 17° 9′ : 7·6–8·1 below 11 : Per., 384^d. Pogson.

R (var.). XIX^h 10·8^m, S 19° 29′ : 7–8 to 12·5 : Per., 268·7^d. Pogson.

Es-Birm. 595. XIX^h 13·4^m, S 16° 6′ : 6·8 : R. Holden. IV. Es.

S (var.). XIX^h 13·6^m, S 19° 12′ : 9·1–10·4 to 14·5 : Per., 230·6^d. Pogson.

υ XIX^h 16·0^m, S 16° 8′ : 4·7 : F. bright. At Harvard.

Es-Birm. 611. XIX^h 28·6^m, S 16° 35′ : 7·2 : R. h. IV. Se.

Var. XIX^h 49·7^m, S 29° 26′ : 7·5 below 12·6 : unknown. At Harvard.

Es-Birm. 642. XX^h 0·8^m, S 27° 33′ : 8 : R. h.

Clusters and Nebulæ.

6514 (M. 20). XVII^h 56·3^m, S 23° 2′. The Trifid neb. closely *f*, a cruciform group. Very curious object; pair with minute *comes* 'where three ways meet, dark rifts through nebulosity.' β, with 36-in., sees six stars with positions as follows:—

A B : 8, 10·6 : 22°·5 : 6″·1. A C : 212°·3 : 10″·7. C = 8·8. C D : 281°·7 : 2″·2. D = 10·5. C E : 190°·8 : 6″·2. E = 12·4. A F : 106°·4 : 22″·1. F = 13·8. C G : 211°·9 :

[SAGITTARIUS]

29″·6. Spect. not gaseous; yet La. and Holden report conspicuous change. Neb. imperfectly seen by Sm. as well as myself; rather low. Grand region.

6523 (M. 8). XVII^h 57·6^m, S 24° 22′. Splendid Galaxy object; visible to naked eye. In a large field we find a bright, coarse triple star, followed by a resolvable luminous mass, including two stars, or starry centres, and then by a loose bright cl. enclosed by several stars: a very fine combination. h., a set of milky streaks and loops. Se. suspects change, and finds the spectrum gaseous.[1]

6531 (M. 21). XVII^h 58·7^m, S 22° 30′. In a lucid region.

6568 (H. VII 30). XVIII^h 6·8^m, S 21° 37′. Curious large undefined cloud of 10 m^s. (h. 11–13 m^s.) stars; requiring low power and steady gazing; $\frac{1}{2}$° s of μ^1.

[1] At XVII^h 57^m, S 18° 50′ a little np μ is a spot referred to by Se. as exemplifying in a high degree the marvellous structure which the great achromatic at Rome shows in the Galaxy. The remarks of this accomplished astronomer on the successive layers of stars are very curious: first he finds large stars and lucid clusters; then a layer of smaller stars, certainly below 12 m^s.; then a nebulous stratum with occasional openings. But what, he says, startled him, and all to whom he showed it, was the regular disposition of the larger stars in figures 'si géométriques qu'il est impossible de les croire accidentelles. La plus grande partie sont comme des arcs de spirale; on peut compter jusqu'à 10 ou 12 étoiles de la 9me à la 10me grandeur . . . se suivant sur une même courbe comme les grains de chapelet; quelquefois elles forment des rayons qui semblent diverger d'un centre commun, et ce qui est bien singulier, on voit d'ordinaire que, soit au centre des rayons, soit au commencement de la branche de la courbe, on trouve une étoile plus grande et rouge. Il est impossible de croire que telle distribution soit accidentelle.' He mentions, besides this spot, several instances in Cygnus. Compare the spiral structure discovered by the E. of Rosse in many nebulæ; and see also Sm.'s remark on M. 35.

[SAGITTARIUS]

6626 (M. 28). XVIII^h 18·4^m, S 24° 55′. Not bright. h., 14–16 m^s. 1° *np* λ.

M. 25. XVIII^h 24·1^m, S 19° 2′. Coarse and brilliant. Not in G. C.

6656 (M. 22). XVIII^h 30·3^m, S 23° 59′. Beautiful bright cl., very interesting from visibility of components, largest 10 and 11 m^s., which makes it a valuable object for common telescopes, and a clue to the structure of many more distant or difficult neb. h. makes all the stars of two sizes, 11 and 15 m^s., as if 'one shell over another,' and thinks the larger ones ruddy. Midway between μ and σ.

6818 (H. IV 51). XIX^h 38·3^m, S 14° 23′. Plan., bl., like star out of focus. E. of Rosse, and D'A. darker centre; h. otherwise. Huggins, spect. gas. 2° *n*, a little *f* 54.

6864 (M. 75). XX^h 0·2^m, S 22° 12′. Bright nucleus with low power. h., resolvable.

SCORPIO.

A fine constellation, little noticed by casual star-gazers from its low altitude and short continuance above the horizon, with the additional disadvantage of its culminating during the brief summer's night. The student will do well to look out for it, and it will repay an hour or two of extra watching.

Double Stars.

2 (β 36). XV^h 47·6^m, S 25° 2′. Cin., 6, 8 : 279° : 3″.

ξ (Σ 1998). XV^h 58·9^m, S 11° 6′ : 4·9, 5·2, 7·2 : 356° : 78°·6 : 1″·1, 6″·7 : 2 yw., blsh. w., '25. Ha., 20°·6 : 65°·3 : 1″, 7″·2, '88. A triple system like ζ Cancri, close pair, Per., 105·19 yrs., Schorr. Elong?? '51. Beautiful field.

[SCORPIO]

s a little *f* is Σ 1999 : 7·4, 8·1 : 102°·2 : 10″·5 : w. (some obs. bl., or purp.), yw. Sa., 11 m^s. *f*.

β (H*h*. 494). XV^h 59·6^m, S 19° 31′. Σ, 2, 4 : 24°·4 : 13″·1 : o. Pale y., grnsh.?, '50. *β*, 2 double : 10 : 93°·9 : o″·9.

11 (*β* 39). XVI^h 2·1^m, S 12° 28′ : De., 6·1, 10·4 : 256°·5 : 3″·3.

ν (H*h*. 497). XVI^h 6·1^m, S 19° 12′ : De., 4·1, 7 : 336°·8 : 40″·8. Jacob subdivided 7. De., 7, 8 : 47°·9 : 1″·9, '75. I have seen it easily with 5½-in. Grover has even just separated it with 2-in. It could hardly have escaped h., or, indeed, Sm., in 1831, if as conspicuous then as now. *β*, De., and others, 4 double. De., 4·1, 6·6 : 360° : o″·7, '76. Ha. gives A B : 4°·9 : o″·6 : C D 49°·7 : 1″·9, '88. Probably a quadruple system.

H*h*. 504. XVI^h 14·7^m, S 19° 53′. Cincin., 8·5, 9·5 : 22°·5 : 12″·7. Another pair in field *p*, H*h*. 503, forms a beautiful group. 1° *p* *ψ* Oph.

σ (H*h*. 505). XVI^h 15·1^m, S 25° 21′ : Cincin., 3, 8 : 271°·2 : 20″·4.

a (Antares). XVI^h 23·3^m, S 26° 13′. This great star Sm. justly terms fiery red; and it is a grand telescopic object. Its tint, however, is not uniform; to me the disc appears y., with flashes of deep crimson alternating with a less proportion of fine green. The latter mixture has perhaps been subsequently accounted for by the discovery (in 1845,[1] by Mitchel in America) of a 7 m^s. green (blue K., P. Sm.) star near enough to the principal to be usually involved in its flaming rays; and forming an atmospheric rather than an optical test. Warner has seen it with 2¾-in. D. gives

[1] So generally stated, but Burg had noticed a double emersion from occultation in 1819; and Grant had discovered the *comes* in India, 1844, July 23 (M. N. XXIII 1).

[SCORPIO]

275°·7 : 3″·7, '64, and it is possibly fixed, but measures conflicting. D. noticed a curious proof of its independent, not contrasted grn. light, when it emerged, in 1856, from behind the dark limb of the Moon before its overpowering neighbour. Fine III-type spectrum.

P. XVI 236. XVI^h 51·2^m, S 19° 24′ : Cincin., 6·5, 8 : 231°·5 : 4″·8 : o. W., blsh., or purp., '54.

Stars with Remarkable Spectra and Variables.

Es-Birm. 430. XV^h 16·8^m, S 28° 49′ : 8·5 : R Holden.

Star. XVI^h 0·6^m, S 25° 57′ : 8½. Type V. At Harvard.

X (var.). XVI^h 2·7^m, S 21° 16′ : 11? to 13? Per., 199^d. Peters.

W (var.). XVI^h 5·9^m, S 19° 53′ : 10–11·2 to below 14·7 : Per., 222·3^d. Palisa.

T (var.). XVI^h 11·1^m, S 22° 44′ : 7 below 12. Auwers (see M. 80).

R (var.). XVI^h 11·7^m, S 22° 42′ : 9·4–10·5 below 13 : Per., 224·5^d. Charcornac.

S (var.). XVI^h 11·7^m, S 22° 39′ : 9·1–10·5 below 13 : Per., 176·7^d. Charcornac.

U (var.). XVI^h 16·7^m, S 17° 39′ : 9? below 12 : one appearance. Pogson.

Clusters.

6093 (M. 80). XVI^h 11·1^m, S 22° 44′. Like a comet; in a beautiful field, halfway between α and β. H. calls it the richest and most condensed mass of stars in the firmament, and speaks of it as on the W. edge of a vast starless opening 4° broad; in which, however, I found many minute stars. h., cl. 14 m^s. Beautiful field. Nearly central, or more probably between it and us, is the strange var., T., which,

[PE(

xxiiʰ 23·5ᵐ, N

1°·5, '88.

2912). xxiiʰ 24·9ᵐ

31. β, 130°·0 : c

xxiiʰ 27·6ᵐ, N 6

xxiiʰ 29·5ᵐ, N 3

xxiiʰ 36·0ᵐ, N 2

xxiiʰ 37·1ᵐ, N 2

a., 156°·2 : 1″, '8

775). xxiiʰ 38·3ᵐ

ᵉ. *comes*, but th

int var., more or

le, 10·1, 10·1 : 8;

01). xxiiʰ 41·6ᵐ,

β, 112°·6 : 11″·

5. xxiiʰ 45·0ᵐ, N

2. (rej.). xxiiʰ 4

: 18″·3.

. xxiiʰ 49·8ᵐ, N

483). xxiiʰ 54

Ha., 215°·8,

. xxiiiʰ 0·2ᵐ,

. xxiiiʰ 2·7ᵐ,

Several little

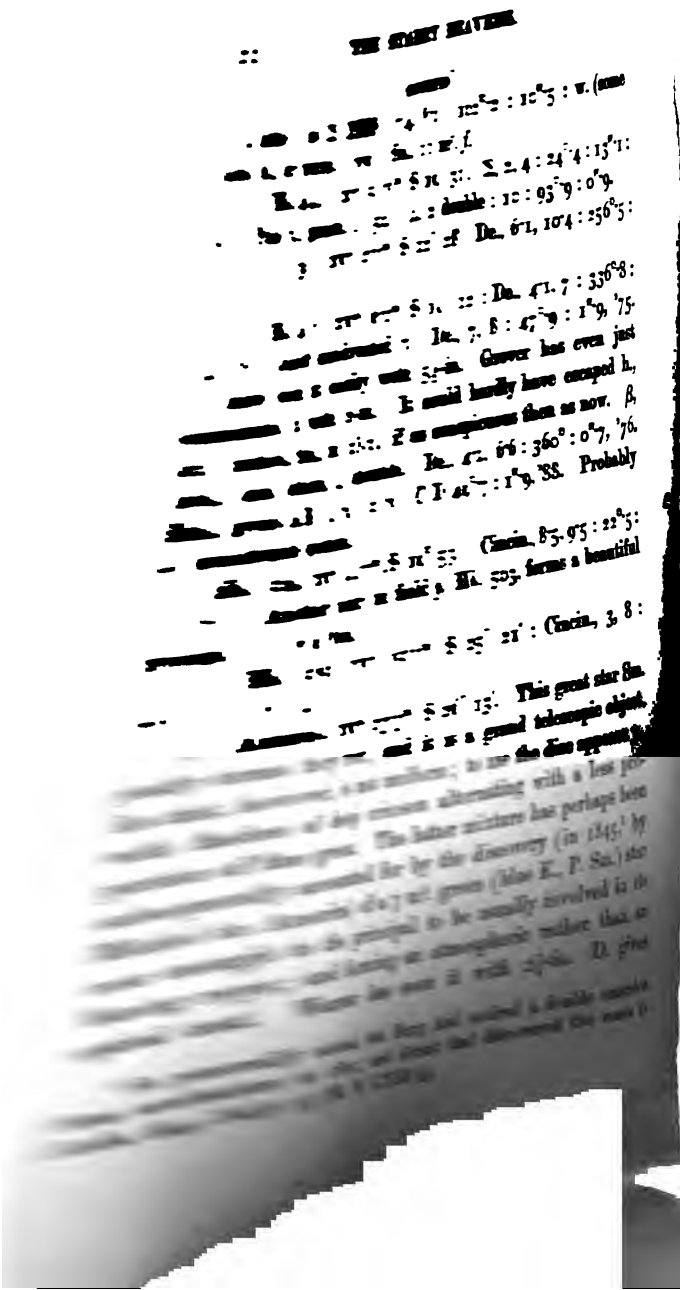
n this region.

2982). xxiiiʰ

o. III Ty

. xxiiiʰ 7·9ᵐ,

. xxiiiʰ 8·4ᵐ



[SCORPIO]

3″·7, '64, and it is possibly fixed, but measures
ng. D. noticed a curious proof of its independent,
rasted grn. light, when it emerged, in 1856, from
he dark limb of the Moon before its overpowering
r. Fine III-type spectrum.

VI 236. XVI^h 51·2^m, S 19° 24′ : Cincin., 6·5, 8 :
″·8 : 0. W., blsh., or purp., '54.

s with Remarkable Spectra and Variables.

rm. 430. XV^h 16·8^m, S 28° 49′ : 8·5 : R Holden.
XVI^h 17·6^m, S 25° 37′ : 8½. Type V. At Harvard.
). XVI^h 27^m, S 21° 16′ : 11? to 13? Per.,
). XVI^h 5·9^m, S 19° 55′ : 10–11·2 to below 14·7 :
). XVI^h 11·2^m, S 22° 46′ : 7 below 12. Answers
). XVI^h 11·7^m, S 22° 42′ : 9·4–10·5 below 13 :
). XVI^h 11·7^m, S 22° 36′ : 9·1–10·5 below 13 : Per.,
). XVI^h 16·7^m, S 23° 26′ : 9? below 12 :

Clusters.

XVI^h 11·1^m, S 22° 46′. Like a comet;
between α and β. H. calls it the
of stars in the firmament,

1860, between May 18 and 21, had blazed out to 7 m^s., extinguishing apparently the cl., had almost faded by June 16, and has never distinctly reappeared. In field, *f* a little *n*, are the two vars. R and S; the whole in singular juxtaposition.

6121 (M. 4). XVI^h 17·5^m, S 26° 17′. Large, rather dim, resolvable, followed by a vacant starless space. h. has remarked many vacancies of this kind. See Appendix I.

6266 (M. 62). XVI^h 54·8^m, S 29° 56′. h., fine cl., but very low.

SCUTUM SOBIESKII.

This asterism, which worthily associates the memory of the Polish hero with the most brilliant part of the Galaxy visible in our latitudes, is full of splendid telescopic fields; and the very ground of the Milky Way seems here resolvable.

Double Stars.

Σ 2303. XVIII^h 14·7^m, S 8° 2′ : 6·7, 9·2 : 216°·4 : 3″·2 : ysh., d. Ha., 223°·3 : 2″·9, '87.

Σ 2306. XVIII^h 16·5^m, S 15° 9′ : 7·2, 7·9 : 219°·5 : 12″·8 : y., v. bl. Beautiful. Mitchel split 7·9. Cincin., 65°·1 : 1″·3. Fixed?

Σ 2313. XVIII^h 19·4^m, S 6° 39′ : 7·2, 8·5 : 199° : 6″·1 : yw., ash.

Σ 2325. XVIII^h 25·9^m, S 10° 52′ : 6, 9·3 : 257°·9 : 12″·3 : w., o.

Σ 2337. XVIII^h 29·2^m, S 14° 48′ : 7·8, 8·8 : 297°·4 : 16″·4 : w., blsh.

Σ 2373. XVIII^h 40·3^m, S 10° 36′ : 7·1, 8·1 : 339°·1 : 4″·2 : w., ashy.

[SCUTUM SOBIESKII]

Σ 2391. XVIII^h 43·3^m, S 6° 7′ : 6·2, 9 : 332°·6 : 37″·9 : yw., o.

Stars with Remarkable Spectra and Variable.

Es-Birm. 527. XVIII^h 12·7^m, S 13° 29′ : 9·2 : R. Holden. IV? Es.

Star. XVIII^h 13·5^m, S 11° 40′ : 8·7. Type V. At Harvard.

Es-Birm. 542. XVIII^h 27·0^m, S 14° 56′ : 6·7 : R. D'A. III. Es.

Es-Birm. 551. XVIII^h 33·2^m, S 14° 56′ : 8·2 : R. D'A. III. Es.

Es-Birm. 562. XVIII^h 39·4^m, S 6° 44′ : 8·8 : R. Webb. III. Es. A. 7·5., red orange (B), 6′ *n*.

R (var.). XVIII^h 42·1^m, S 5° 49′ : 4·7–5·7 to 6–9 : Per., 71·1^d. Piggott. Es. finds the bands fade out at max., so that the spectrum varies from nearly continuous to a well-marked III.

Es-Birm. 569. XVIII^h 44·3^m, S 6° 1′ : 6·8 orange R. Webb. III. Es.

Es-Birm. 570. XVIII^h 44·9^m, S 8° 1′ : 7·1 : R. : h. IV. Du. Var.

Clusters and Nebula.

6603 (M. 24). XVIII^h 12·6^m, S 18° 27′. Magnificent region, visible to the unaided eye as a kind of protuberance of the Galaxy; and so considered by h., who gives stars 15 m^s. It is accompanied by two little pairs. 2° *n* of μ Sagittarii.

6611 (M. 16). XVIII^h 13·2^m, S 13° 49′. Grand cl.

6613 (M. 18). XVIII^h 14·1^m, S 17° 10′. Glorious field in very rich vicinity; *s* lies a region of surpassing splendour.

[SCUTUM SOBIESKII]

6618 (M. 17). XVIII^h 15·0^m, S 16° 14′. The 'horseshoe' neb. visible in finder, 1° *n.* of M. 18, described by Sm. as a magnificent arched, and irresolvable nebulosity—in a splendid group of stars. Well has he observed, 'The wonderful quantity of suns profusely scattered about here would be confounding, but for their increasing our reverence of the Omnipotent Creator, by revealing to us the immensity of the creation.' The neb., however, Huggins finds to be gaseous; and Holden traces some changes of position with regard to neighbouring stars.

6694 (M. 26). XVIII^h 39·7^m, S 9° 29′. Coarse cl.

6712 (H. I 47). XVIII^h 47·6^m, S 8° 49′. Beautiful resolvable neb.

SERPENS.

A long rambling constellation, mixed with Ophiuchus. It contains some fine telescopic objects.

Double Stars.

2 (β 348). XIV^h 56·7^m, N 0° 14′ : De., 5·1, 7·4 : 114°·6 : 0″·5.

β 943. XV^h 13·3^m, N 1° 19′ : 6·6, 12·2 : 92°·5 : 2″·3.

Σ 1931. XV^h 13·9^m, N 10° 47′ : 6·2, 7·6 : 172°·5 : 13″·1 : w.

5 (Σ 1930). XV^h 14·2^m, N 2° 9′ : 5, 10 : 41° : 10″·1 : ysh., o. Rapid c.p.m. Very near M. 5 Libræ.

6 (β 32). XV^h 16·0^m, N 1° 4′ : De., 4·6, 9·4 : 13°·2 : 2″·3, '75. β, 17°·9, '89. Bin.? Sa., y., grey bl. Burton, *comes*, est. 80° : 50″.

Σ 1940. XV^h 21·6^m, N 18° 31′ : 8·2, 8·7 : 325°·5 : 1″·5 : v. w.

[SERPENS]

Σ 1943. xv^h 22·7^m, N 5° 43′ : 8·5, 9 : 153°·5 : 5″·3 : w.

Σ 1944. xv^h 22·8^m, N 6° 27′ : 7·5, 8·1 : 341°·6 : 1″·3 : w. Tarrant, 330°·3, '89. Bin.

Σ 1945. xv^h 23·2^m, N 15° 3′ : 8·8, 9·5 : 273°·2 : 30″·7 : o. *Comes* to 9·5, 9·5 : 280°·4 : 8″·8.

Σ 1949. xv^h 25·9^m, N 13° 21′ : 9, 9·2 : 213°·2 : 16″·4 : o.

Σ 1952. xv^h 27·1^m, N 10° 0′ : 7·8, 9 : 221°·9 : 15″·9 : w., o.

δ (Σ 1954). xv^h 30·0^m, N 10° 53′ : 3, 4 : 197°·3 : 2″·7 : yw., ashy, '33. Ha., 189°·4 : 3″·6, '89. Bin. Fine specimen of a moderately close unequal pair. W., blsh. w., '50. De., 3·9, 5·5.

β 619. xv^h 38·5^m, N 14° 0′ : 6½, 7 : 356°·6 : 0″·4.

α (h. 1277). xv^h 39·3^m, N 6° 44′ : β, 2, 12 : 353°·2 : 58″·7, Obvious, 9½-in. spec., '67. Sa., 2½-in. achr., '74.

β (Σ 1970). xv^h 41·6^m, N 15° 44′ : 3, 9·2 : 265°·0 : 30″·6 : blsh. w., o. Pale y., lilac, 9½-in. spec., '72; so Fr., '79. De., 3·4, 9·1.

Σ 3126. xv^h 44·9^m, S 2° 51′ : 9·2, 9·2 : 282°·3 : 2″·4 : o.

Σ 1978. xv^h 46·3^m, N 14° 59′ : 8·5, 9 : 235°·2 : 15″·3 : w.

Σ 1979. xv^h 46·3^m, N 22° 47′ : 8·5, 9·1 : 247°·4 : 9″·4 : w.

Σ 1985. xv^h 50·7^m, S 1° 52′ : 7, 8·1 : 326°·6 : 5″·4 : yw., ash. Ha., 334°·3, '87.

Σ 1986. xv^h 50·7^m, N 10° 23′ : 8·2, 8·8 : 94°·4 : 14″·4 : w.

Σ 1988. xv^h 52·1^m, N 12° 46′ : 7·5, 8·2 : 266°·3 : 2″·9 : v. w.

Σ 1987. xv^h 52·2^m, N 3° 41′ : 7·2, 8·7 : 324°·0 : 10″·3 : w., ash. W., lilac, '50. De., 6·9, 8·4.

Σ 3101. xv^h 53·7^m, S 2° 46′ : 8·2, 8·5 : 60°·3 : 2″ : yw.

Σ 1990. xv^h 54·6^m, N 22° 5′ : 8, 8·5 : 59° : 56″·2 : ysh.

[SERPENS]

OΣ 303. xv^h 56·2^m, N 13° 34′ : 7·4, 7·9 : 134°·4 : 0″·8. Tarrant, 140°·3 : 0″·9, '85.

Σ 2008. xvi^h 2·4^m, S 2° 23′ : 8·5, 9·2 : 58°·4 : 8″·8 : yw., o.

Σ 2017. xvi^h 7·5^m, N 14° 49′ : 7·7, 8·4 : 249°·7 : 25″ : yw. A pretty pair. Must be over 40″ apart, about 212° from p.m., '92.

49 (Σ 2021). xvi^h 8·6^m, N 13° 48′ : 6·7, 6·9 : 316°·7 : 3″·2 : w., '32. Ha., 331°·3 : 3″·9, '87. Bin. in long period. Sa., minute *comes f.*

Σ 2041. xvi^h 16·7^m, N 1° 27′ : 7·3, 10·5 : 4°·4 : 3″·1 : y., o. Sa., most beautiful; 10·5 : bl. De., 7·2, 9·9.

Σ 2119. xvii^h 0·8^m, S 13° 48′ : 8, 8 : 17°·8 : 2″ : v. w.

β 282. xvii^h 9·6^m, S 14° 28′ : 6·2, 11·8 : 151°·7 : 4″·4.

ν (Hℏ. 535). xvii^h 15·2^m, S 12° 45′ : Sm., 4·5, 9 : 31°·3 : 50″·8 : 9 small, '50, '55; so Fr., '76. Σ, 4, 8·5.

Σ 2204. xvii^h 40·7^m, S 13° 16′ : 7, 7·2 : 23°·6 : 14″·3 : w

Σ 2250. xvii^h 53·9^m, S 6° 51′ : 8, 9 : 346°·5 : 7″·7 : v. w.

OΣΣ 165. xviii^h 1·1^m, N 4° 33′ : De., 7·4, 7·9 : 142°·3 : 66″ : y., w. Fine region.

Σ 2294. xviii^h 9·4^m, N 0° 9′ : 7·4, 7·7 : 91°·9 : 1″·1 : w. Perrotin., Elongated? '85.

59 (Σ 2316). xviii^h 22·1^m, N 0° 8′ : 5·5, 7·8 : 314°·1 : 3″·9 : y., bl. h., or., grn. Brightest of vicinity.

Σ 2322. xviii^h 25·1^m, N 4° 0′ : 5·7, 11 : 170°·5 : 19″·6 : yw., o. De., 6·5, 11.

Σ 2324. xviii^h 25·9^m, N 1° 19′ : 8·2, 8·5 : 146° : 2″·4 : yw.

Σ 2347. xviii^h 32·8^m, S 0° 28′ : 7·5, 9·4 : 259°·3 : 3″·2 : ysh., o.

Σ 2361. xviii^h 35·6^m, N 3° 1′ : 8·3, 8·8 : 211°·5 : 25″·1 : w.

[SERPENS]

Σ 2375. XVIII^h 40·6^m, N 5° 24′ : 6·2, 6·6 : 108°·1 : 2″·2 : w. Tarrant, 113°·2 : 2″·1, '87. Bin.

θ (Σ 2417). XVIII^h 51·2^m, N 4° 4′ : 4, 4·2 : 103°·8 : 21″·6 : yw. Sm. first suggested variability, and Gould found var. from 4·1 to 4·6. A difference of 1·3 m^s. was noted between the stars at Harvard on one occasion. Relatively fixed with c.p.m. (11′ *n* Miss Brown sees a red star. Es., 8·5 : III.) This noble pair, in a very fine field, lies to the naked eye in a dark space between two streams of the Galaxy. There is a traditional misrepresentation of the latter in this region where both streams were misdrawn and misplaced on the older globes and maps. Much fine sweeping occurs among moderate-sized stars between these branches, showing that the darkness to the naked eye is due to the absence of the unresolved background. In h.'s "Outlines of Astronomy" is a very accurate description of the Galaxy, and it has been carefully delineated by Heis, Gould, and Boeddicker.

Stars with Remarkable Spectra and Variables.

S (var.). XV^h 17·0^m, N 14° 40′ : 7·6–8·7 to 12·5? Per., 365·1^d. Harding.

τ^4. XV^h 31·9^m, N 15° 25′ : 6·7 : R. D'A. III. Se.

Es-Birm. 437. XV^h 38·4^m, S 1° 19′ : 10 : R. Holden.

R (var.). XV^h 46·1^m, N 15° 26′ : 5·6–7·6 to 13 : Per., 357·2^d. Harding.

47. XVI^h 3·6^m, N 8° 48′ : 6·4 : III. D'A. A 7·5 m^s. 4′ *n* similar.

T (var.). XVIII^h 23·9^m, N 6° 14′ : 9·1–10·5 below 13·5 : Per., 342·3^d. Baxendell.

[SERPENS]

Cluster and Groups.

Group. ± XVIII^h 1^m, S 3° 10′. Bright open triangle.

Group. ± XVIII^h 21^m, N 1° 41′. Curious rhomboid : 8, 8, 10, 10.

6633 (H. VIII 72). XVIII^h 23·6^m, N 6° 29′. Very fine, with star 7 m^s. in large field; eye object. Baxendell found var. T among outliers; compare M. 80 in Scorpio. Between it and θ, nearer the former, is a beautiful large cloud of stars, chiefly 8 and 9 m^s., a nearer part, apparently of the Galaxy; visible to naked eye, and requiring a large field.

Group. ± XVIII^h 33^m, N 5° 6′. Very large, subdivided, chiefly 9 and 10 m^{ss}.

SEXTANS.

A modern asterism, as its name denotes, being one of the minor constellations, formed by Hevelius out of unclaimed stars lying between the ancient ones.

Double Stars.

Σ 1371. IX^h 30·2^m, N 4° 22′ : 8, 10·5 : 279°·8 : 7″·1 : ysh., o. h., 10·5 : dusky red; very remarkable colour.

8 (A. C. 5). IX^h 47·5^m, S 7° 38′ : β, 5½, 5¾ : 161° : 0″·2, '78. 113°·1 : 0″·3, '91. Bin. Per. about 60 yrs? *Comes*, 9 : 145°·3 : 35″·9.

9 (South 605). IX^h 48·9^m, N 5° 25′ : Σ, 6·7, 9·0. Se., 52″·4 : y., bl. Red, bl., '52. Fr., or., '77. Pointed at by α and π Leonis.

Σ 1404. IX^h 59·2^m, S 1° 11′ : 8·7, 9·3 : 292°·8 : 6″·1 : w.

Σ 1441. X^h 26·0^m, S 7° 7′ : 6·4, 9·9 : 169°·3 : 2″·6 : gold, o.

[SEXTANS]

Σ 1452. x^h $30{\cdot}6^m$, N 3° 5′ : 9, 9·1 : 329°·7 : 10″·1 : 0.

35 (Σ 1466). x^h $38{\cdot}1^m$, N 5° 16′ : 6·1, 7·2 : 240°·5 : 6″·7 : y., bl. Y., ruddy, '52. So Fr., '77. Much diff. as to cols. Fine field, especially if large.

Σ 1470. x^h $41{\cdot}2^m$, S 5° 14′ : 8·2, 8·5 : 6°·2 : 1″·4 : 0.

Pair and Suspected Variable.

Ll. 19662. IX^h $58{\cdot}8^m$, S 9° 5′. Suspected var. by Gore. Ll., 4·5; Harding, 5: Heis, 6–7; Gore, 7; Gould, 6·4. See a list of 51 suspect. vars. in Gore's interesting and valuable little work, 'Southern Stellar Objects.'

18. x^h $5{\cdot}9^m$, S 7° 55′ : 6 : pale or. Forms a beautiful combination with 17 pale blue 48 sec. *p*. Es.

Nebulæ.

3115 (H. I 163). x^h $0{\cdot}3^m$, S 7° 13′. Very distinct, with much brighter centre, bearing magnifying unusually well.

3166, 3169 (H. I 3, 4). x^h $9{\cdot}1^m$, N 3° 58′. Two very faint nebulæ in a glorious field. H. missed the fainter, though he observed the other 4 times. D'A. saw 3, and called H. I 3 *admodum luminosa*. Such was the working of the Copenhagen 11-in. achr.

TAURUS.

An interesting constellation containing two beautiful groups familiar to the first beginner in stellar astronomy. The Pleiades, and Hyades. Neither of these, however, is sufficiently concentrated to make a good telescopic object, excepting in an unusually large field. The 6 principal stars of the Pleiades are evident to any clear sight; but glimpses of more are easily attainable. Möstlin is said by Kepler to have distinctly made out 14, the relative

positions of 11 being estimated with surprising accuracy in the absence of a telescope. Carrington and Denning have seen 14; even 16 are spoken of by Carl von Littrow, who says 11 are not unfrequently perceived. A beautiful triangle of small stars will be found near the *lucida*, Alcyone (III^h 41·6^m, N 23° 48′). I have noticed the remarkable absence of colour in the group, except in one minute ruby star, and an or. outlier. Wolf has charted 499 stars here down to 14 m^s. The photographic plate shows over 2000. Pickering has recently discovered that the spectrum of Pleione resembles that of P Cygni, so that this star may possibly be the lost Pleiad.

Double Stars.

Σ 380. III^h 16·3^m, N 8° 25′ : 8·3, 9·3 : 90°·1 : 1″·2 : o. Ha., 71°·9, '88. Bin.

Σ 383. III^h 18·6^m, N 17° 12′ : 8, 9 : 120°·1 : 5″·7 : yw., w.

Σ 394. III^h 22·2^m, N 20° 7′ : 7, 8 : 163°·3 : 6″·7 : ysh., blsh.

β 879. III^h 23·1^m, N 11° 2′ : 6·5, 12·5 : 71°·1 : 24″·6.

Σ 401. III^h 25·3^m, N 27° 14′ : 6·5, 7 : 270° : 11″·1 : w. 10′ *n* a little *p* is Σ I 7 : 6·9, 7·4 : 233° : 44″ : v. w.

Σ 403. III^h 25·5^m, N 19° 27′ : 8·5, 8·5 : 181°·7 : 2″·9 : w.

Σ 406. III^h 25·5^m, N 4° 49′ : 7, 9 : 123°·8 : 9″·3 : w., o.

7 (Σ 412). III^h 28·5^m, N 24° 7′ : 6·6, 6·7 : 269°·9 : o″·7 : ysh., '30. Ha., 212°·1 : o″·2, '89. Bin. Fine test; elong. 5½-in., '61. *Comes*, 10 : 63°·0 : 22″·4. Ha., 59°·7, '89.

Σ 414. III^h 28·7^m, N 19° 30′ : 8, 8 : 185°·6 : 7″·1 : w. 24 sec. *f* is Σ 416 rej. Es., triple : 8·5, 12·3, 9·7 : 294°·8, 58°·8 : 20″·1, 26″·2; orange, 2 bl.

[TAURUS]

Σ 427. 3^h $34{\cdot}5^m$, N 28° 27′ : 6·6, 7·4 : 208°·6 : 6″·7 : w., blsh. w.

Σ 430. 3^h $35{\cdot}2^m$, N 4° 48′ : 6, 9, 9·8 : 55°·3, 301°·9 : 26″·6, 37″·4 : v. y., o., o.

30 (Σ 452). 3^h $42{\cdot}8^m$, N 10° 50′ : 4·5, 9·6 : 57°·9 : 8″·9 : blsh. grn., o. Pale ysh., grnsh., '50.

OΣ 64. 3^h $44{\cdot}0^m$, N 23° 34′ : 7, 9·9, 9 : 239°, 237° 3″·3, 10″·6.

Σ 457. 3^h $44{\cdot}1^m$, N 22° 23′ : 8·8, 8·8 : 104°·8 : 1″·3 : w.

OΣ 65. 3^h $44{\cdot}3^m$, N 25° 16′ : 6·5, 6·8 : 210°·8 : 0″·8. Ha., 198°·5 : 0″·3, '89. Bin.

Σ 479. 3^h $55{\cdot}0^m$, N 22° 56′ : 7, 7·9, 9·7 : 128°·5, 240°·5 : 7″·4, 58″·1 : w., w., o. 7½, 9, 10; yw., 2 blsh., '55. 9·7 var.? South missed it, '23. Σ rated it 9·4 and 10. De., 9·2, '57. Du., 9·4, '71. Johnson with 2¼-in. achr., '75, '79.

OΣ 70. 3^h $56{\cdot}4^m$, N 9° 43′ : 5·8, 11·8 : 227°·4 : 12″·1.

Σ 491. 4^h $0{\cdot}4^m$, N 10° 42′ : 8·2, 8·8 : 111°·4 : 2″·7 : ysh.

Σ 493. 4^h $1{\cdot}4^m$, N 5° 26′ : 8·5, 9 : 98°·1 : 1″·8 : y. Angle diminishing.

Σ 495. 4^h $2{\cdot}1^m$, N 14° 54′ : 6, 8·8 : 216°·1 : 3″·6 : yw., blsh.

Σ 494. 4^h $2{\cdot}9^m$, N 22° 50′ : 7·7, 7·7 : 189°·9 : 5″·1 : v. w.

Σ 515. 4^h $8{\cdot}2^m$, N 2° 37′ : 8·3, 8·3 : 43°·9 : 3″·5 : w.

47 (β 547). 4^h $8{\cdot}5^m$, N 9° 1′ : 5, 8 : 359°·7 : 0″·9. *Comes*, 9 : 197° : 35″.

Σ 523. 4^h $13{\cdot}8^m$, N 23° 30′ : 7·2, 9·2 : 165° : 10″·3 v. w., o.

55 (OΣ 79). 4^h $14{\cdot}2^m$, N 16° 18′ : 7, 8·8 : 23°·7 : 0″·8 β, 6·4, 7·6 : 87°·9 : 0″·4. Bin.

[TAURUS]

ϕ (OΣΣ 48). IV^h 14·2^m, N 27° 7′ : De., 5, 8 : 245°·5 : 53″·6 : y., o. Pale r., bl., '50.

χ (Σ 528). IV^h 16·5^m, N 25° 23′ : 5·7, 7·8 : 25°·3 : 19″·3 : w., blsh. w. Fr., 7·8 lilac, or ruddy, '79.

β 87. IV^h 16·5^m, N 20° 35′ : 6·6, 10·5 : 169°·4 : 2″. Red, bl. Sa., very lovely. Es-Birm., 86; possibly var.

Σ 535. IV^h 17·7^m, N 11° 8′ : 6·7, 8·2 : 353°·9 : 1″·9 : ysh., blsh. Ha., 334°·5 : 1″·5, '88. Bin.

62 (Σ 534). IV^h 18·0^m, N 24° 4′ : 6·2, 8 : 289°·7 : 28″·9 : w., o. 8, bl., '50. Fine field.

κ^1, κ^2 (Σ I 9). IV^h 19·4^m, N 22° 4′ : 5, 6. A pretty minute pair between them. De., 11·2, 11·6 : 327°·2 : 4″·9.

Σ 545. IV^h 21·3^m, N 17° 58′ : 7·5, 9·3 : 57° : 19″·1 : w., o. 9·3 blsh., '78.

Σ 548. IV^h 22·5^m, N 30° 9′ : 6, 8 : 35°·9 : 14″·2 : ysh., blsh.

θ (Σ I 10). IV^h 22·8^m, N 15° 44′ : 4·7, 5 : 346°·2 : 337″·4 : w., ysh. Among Hyades; a pair to naked eye.

80 (Σ 554). IV^h 24·4^m, N 15° 25′ : 6·5, 9 : 12°·9 : 1″·7 : v. w., o., '31. β 7° : 0″·6, '78. Single, '90–'91. Bin. Σ c.p.m. In Hyades. De., 6·2, 8·5.

Σ 559. IV^h 27·8^m, N 17° 49′ : 7, 7 : 278°·7 : 3″ : v. w. A little *f* a line from α to ϵ.

α (Σ II 2). IV^h 30·2^m, N 16° 19′ : 1, 11·2 : 36° : 109″ : gold, o. Aldebaran, in Arabic, *the hindmost*, because he seems to drive the Pleiades before him. The minute attendant is a good light test. D. has seen it with $2\frac{3}{4}$-in., Wa. with $1\frac{7}{8}$-in.[1] My $3\frac{7}{10}$-in. showed it certainly, but not

[1] It may be remarked, however, once for all, that personal equation and atmospheric conditions enter so largely into these estimates that the employment of such tests is seldom conclusive in its results.

[TAURUS]

without much attention; 144 suited it better than 80. De. makes it 10·3. β divides it into 11, 13·5 : 279° : 1″·8, which may be moving; he also detected a fainter attendant 109°·0 : 31″·4, which has the same p.m. as α, whereas the pair is gradually being left behind (117″·0, '90). Occultations of Aldebaran are not infrequent, as it lies in the Moon's way; they are striking phænomena, and to some observers are apt to exhibit the singular optical illusion of *projection*. Aldebaran is a beautiful example of the II or solar type of spectrum.

88 (OΣΣ 52). IV^h 30·2^m, N 9° 57′ : De., 4, 7·5 : 299° : 69″·2 : yw., y. red. Y., pale lilac, '50.

Σ 569. IV^h 30·6^m, N 9° 0′ : 8·2, 8·7 : 132°·8 : 7″·9 : w.

Σ 567. IV^h 30·7^m, N 19° 16′ : 8·5, 9 : 302°·9 : 1″·4 : y. Ha., 321°·5 : 1″·8, '91.

σ^2, σ^1 (Σ I 11). IV^h 33·5^m, N 15° 43′ : 5·2, 5·7. This pair, and κ^1, κ^2 look like connected systems.

τ (OΣΣ 54). IV^h 36·2^m, N 22° 46′ : De., 5, 7·2 : 212°·4 : 62″·9 : w., bl.

99 (β 1045). IV^h 51·7^m, N 23° 48′ : 6, 12·3 : 6°·2 : 6″·3.

OΣΣ 58. IV^h 53·3^m, N 14° 24′ : De., 5·2, 6·7, 8 : 304°·9, 88°·4 : 39″·2, 54″·7 : grn., bl., o., '*colori certi*.' W., lilac, o., '50. 4th faint star *f*. Beautiful. Wa., 2 more *p* and *f*. *nf* o^1, o^2, Orionis.

Σ I 12. IV^h 55·5^m, N 26° 32′ : 6, 7 : 158°·6 : 78″·8 : yw.

OΣ 97. V^h 0·5^m, N 22° 57′ : 6·1, 7·8 : 158°·6 : 0″·4 : y., o. Single for last 30 yrs.

103 (Edgecombe). V^h 2·0^m, N 24° 8′ : β, 6, 12·5 : 147°·9 : 12″·9. A 9 m^g. 197° : 35″.

Σ 670. V^h 10·9 , N 18° 21′ : 7·7, 8·2 : 171°·1 : 2″·3 : w., blsh.

Σ 671. V^h 11·1^m, N 26° 0′ : 8·5, 9 : 125°·9 : 17″·2 : w.

[TAURUS]

Σ 680. v^h 13·3^m, N 20° 2′ : 6·3, 10·2 : 201°·8 : 8″·7 : y., o. Bird, *comes* dull red, bearing any illumination. Last of curious series of 6 stars nearly *f* each other. The next *p* is Σ 674 : 6·5, 9·5 : 147°·3 : 10″·5 : v. w., o.

Σ 686. v^h 14·8^m, N 23° 56′ : 7·9, 8·1 : 219°·9 : 9″·2 : w.

Σ 697. v^h 17·8^m, N 15° 57′ : 7·2, 8·2 : 285° : 26″ : w., blsh. w.

Σ 694. v^h 17·9^m, N 24° 53′ : 8·2, 8·2 : 4°·2 : 1″·3 : w.

111 (Hℏ. 166). v^h 18·6^m, N 17° 17′ : *β*, 5·7, 8·2 : 270°·7 : 74″·8, '79. South, 61″·8, '25, a case of p.m. Y., lilac, '51.

115 (OΣ 107). v^h 21·3^m, N 17° 53′ : 6, 10·8 : 304°·6 : 10″ : w., o.

118 (Σ 716). v^h 23·1^m, N 25° 4′ : 5·8, 6·6 : 196°·8 : 4″·9 : w., blsh. w. Maw, 201°·3 : 5″·1, '89. C.p.m.

OΣΣ 64. v^h 24·0^m, N 18° 20′ : De., 7·2, 7·7 : 20°·6 : 52″·9. *β* sees *comes* to 7·2, 13 : 121°·6 : 9″·9.

Σ 730. v^h 26·4^m, N 16° 59′ : 6·5, 7 : 141°·8 : 9″·8 : v. w. 7, 7·3 : ysh., blsh., 9-in. spec., '72; so Fr. and nearly equal, '76. De., 5·8, 6·7.

Σ 740. v^h 30·3^m, N 21° 8′ : 8·2, 9 : 118°·8 : 21″·8 : y., o. 49′ *n*, 49 sec. *f* is Σ 749 : 7·1, 7·2 : 23°·4 : 0″·7 : v. w., '29. Tarrant, 175°·6 : 1″, '87. Bin. Buffham divided with 6½-in. 'With' spec. *p ζ*, which has a curious curve of small stars *p*.

Σ 742. v^h 30·5^m, N 21° 57′ : 7·2, 7·8 : 246°·2 : 3″·3 : y., w., '30. Ha., 257°·6, '90. A charming object, 2^m *f* M. 1.

Σ 755. v^h 33·0^m, N 23° 14′ : 8·3, 9 : 315°·7 : 6″ : w., o.

Σ 766. v^h 34·6^m, N 15° 18′ : 6·8, 8 : 276°·1 : 9″·6 : w., blsh.

126 (*β* 1007). v^h 35·5^m, N 16° 29′ : 6, 6·2 : 266°·2 : 0″·3, '81. Single, '90. Elongated, '91.

Σ 776. v^h 36·8^m, N 25° 19′ : 8·2, 9·2 : 104°·7 : 2″·1 : o.

[TAURUS]

Σ 777. v^h $37{\cdot}3^m$, N 22° 11′ : 8·7, 8·8 : 85°·4 : 4″·6 : w.

Σ 785. v^h $39{\cdot}7^m$, N 25° 53′ : 6·7, 7·7 : 348°·6 : 13″·8 : w., blsh. w. Very pretty.

Σ 787. v^h $40{\cdot}0^m$, N 21° 16′ : 8·1, 8·5 : 78°·5 : 1″·4 : v. w. Ha., 73°·9 : 1″·1, '90.

OΣ 118. v^h $42{\cdot}4^m$, N 20° 50′ : 6·2, 7·7 : 318°·7 : 0″·6 : ysh., o. Tarrant, 315°·2 : 0″·9, '90. Third star, 7·2 : 160°·6 : 75″·5.

Σ 806. v^h $45{\cdot}3^m$, N 17° 53′ : 8·8, 8·8 : 198°·8 : 10″·7 : o.

136 (β 1054). v^h $47{\cdot}0^m$, N 27° 35′ : 6, 12 : 232°·2 : 15″.

Stars with Remarkable Spectra and Variables.

Es-Birm. 76. iii^h $36{\cdot}6^m$, N 14° 28′ : 8·8 : R. h. III. Fs.

X (var.). iii^h $47{\cdot}8^m$, N 7° 29′ : 6·6 to 8·1. Per.? Gould.

λ (var.). iii^h $55{\cdot}1^m$, N 12° 12′ : 3·4 to 4·2 : Per., 3^d 22^h 52^m 12^s. Algol type. Baxendell.

Es-Birm. 83. iv^h $8{\cdot}7^m$, N 14° 18′ : 7·5 : yr. : III. Vogel.

Es-Birm. 84. iv^h $15{\cdot}1^m$, N 27° 7′ : 7·5 : R. Fr. III? Es.

T (var.). iv^h $16{\cdot}2^m$, N 19° 18′ : 9·2–11·5 to 12·8–13·5 : Irreg. Hind. *nf*, the site of Hind's curious (almost) vanished neb.

Es-Birm. 86. iv^h $16{\cdot}5^m$, N 20° 35′ : 6·5 : R. Se. III? Es.

Es-Birm. 87. iv^h $17{\cdot}8^m$, N 22° 43′ : 8. Chacornac. III. Es.

W (var.). iv^h $22{\cdot}3^m$, N 15° 53′ : 8·2 to 13·5 : Per., 141^d. Es.

R (var.). iv^h $22{\cdot}8^m$, N 9° 56′ : 7·4–9 to 12·8–13·5 : Per., 325^d. Hind.

[TAURUS]

S (var.). IV^h 23·7^m, N 9° 43′ : 9·5–10 below 13·5 : Per., 375·5^d. Oudemans.

Es-Birm. 100. IV^h 44·9^m, N 15° 37′ : 9·4 : R. III. Var. Es.

Es-Birm. 101. IV^h 45·2^m, N 28° 21′ : 8·1 : R. h. IV. Se. Var. Es.

V (var.). IV^h 46·3^m, N 17° 22′ : 8·3–9 below 13·5 : Per., 170·4^d. Auwers.

Es-Birm. 104. IV^h 47·8^m, N 22° 37′ : 9·2 : R. IV? Es.

Es-Birm. 113. IV^h 58·5^m, N 23° 31′ : 8·5 : R. Webb. III. Es.

119. V^h 26·3^m, N 18° 32′ : 4·4 : yr. : III. Se.

Es-Birm. 143. V^h 28·6^m, N 25° 50′ : 8·4 : pale R. Webb. III? Es.

Es-Birm. 148. V^h 32·4^m, N 24° 57′ : 9·5 : R. Markree Cat. IV? Es.

Es-Birm. 149. V^h 33·2^m, N 23° 16′ : 7·8 : R. Sm. III? Es.

Es-Birm. 152. V^h 39·1^m, N 24° 23′ : 8·5 : R. Markree Cat. IV. Du. Var. 7·7 to 9·5?

Es-Birm. 153. V^h 39·7^m, N 20° 39′ : 7·7 : R. Markree Cat. IV. Du. Var. 7 to 8?

Nebulæ and Clusters.

1435. III^h 40·2^m, N 23° 28′. Nebula in Pleiades, discovered by Tempel, 1859; a faint extended somewhat triangular haze, involving, at its *n* extremity, Merope, the bright star *sp* Alcyone, the *lucida* of the group. Suspected var., but evidence conflicting. Has been seen with less than 2-in., but invisible in the 11-in. achr. at Copenhagen, possibly from want of contrast in diminished fields; D'A. says there are nebulæ invisible or barely seen in great

telescopes, which can be perceived easily in their finders. Wolf is certain that it has not changed since '64. Found readily with 5½-in., '63, Oct. 6. Very feeble, '65, Sept. 25; a mere glow when star out of field, 9-in. spec., '72, March 4; '76, Jan. 15, in presence of star 9⅓-in. spec., 1881, Jan 31. Goldschmidt saw it as a projection from a diffused nebulosity encompassing Pleiades; so Wolf. Temple thinks this an illusion, but it has been confirmed by photography. The photo. of the brothers Henry show a remarkable nebulous wisp attached to Maia, and a curious narrow ray running through 6 stars for $2\frac{1}{2}'$ *f.*

1647 (H. VIII 8). $4^h\ 40{\cdot}2^m$, N 18° 53′. Stars 8·5 to 10, round wide pair.

1758 (H. VII 21). $4^h\ 58{\cdot}4^m$, N 23° 38′. Interesting region.

1952 (M. I). $5^h\ 28{\cdot}5^m$, N 21° 57′ : oblong; pale; 1° *np* ζ. Crab neb. of E. of Rosse, who considered it resolvable, with fringes, not, however, subsequently confirmed there. Se. obtained a similar result. Granular, 9⅓-in. spec. D'A., $5\frac{1}{2}' \times 3\frac{1}{2}'$, not resolved. First seen by Bevis, 1731. Its accidental re-discovery by M., while following a comet in 1758, led to the formation of the earliest catalogue of nebulæ.

TRIANGULUM.

An ancient constellation, including several good objects.

Double Stars.

Σ 137. $1^h\ 29{\cdot}8^m$, N 30° 47′ : 8·2, 9 : 86°·6 : 3″·4 : w.

Σ 143. $1^h\ 34{\cdot}7^m$, N 33° 51′ : 7·7, 9 : 319°·8 : 30″·3 : yw. Separating from p.m.; β 34″·4, '79.

[TRIANGULUM]

Σ 158. $1^h\ 41{\cdot}0^m$, N 32° 40′ : 8·3, 8·8 : 246°·2 : 2″·1 : w. Ha., 253°·3 : 1″·9, '87.

Σ 197. $1^h\ 55{\cdot}2^m$, N 34° 49′ : 7·3, 8·3 : 233°·6 : 18″·3 : w., ashy, '33. Now 24″ from p.m.

ε (Σ 201). $1^h\ 57{\cdot}1^m$, N 32° 49′ : 5·3, 11·3 : 119°·6 : 3″·7 : vw., o. Distance increasing and angle diminishing? Star 8 m^s., deep or., 14 sec. *f*.

ι (Σ 227). $2^h\ 6{\cdot}6^m$, N 29° 50′ : 5, 6·4 : 77°·9 : 3″·6 : y., bl. Exquisite, Sm. Fixed.

Σ 239. $2^h\ 11{\cdot}6^m$, N 28° 18′ : 7, 8 : 208°·9 : 14″ : w. Ysh., greyish or blsh. grey, '49, '52. Heis, naked-eye star. Se., 6, 7·5; De., 6·7, 7·5.

Σ 246. $2^h\ 12{\cdot}6^m$, N 34° 2′ : 7·3, 8·5 : 122°·5 : 10″·5 : ysh., blsh.

Σ 269. $2^h\ 22{\cdot}3^m$, N 29° 25′ : 7·5, 9·8 : 340°·4 : 1″·9 : y, ash. Bin. Angle slowly increasing. 7·5 var? Heis, naked eye. 9·8 not seen, '50. De., 7·1, 8·4.

Σ 285. $2^h\ 32{\cdot}6^m$, N 33° 0′ : 7, 7·7 : 177°·5 : 1″·9 : y. Ha., 171°·8, '87. Bin.?

Σ 300. $2^h\ 38{\cdot}7^m$, N 29° 3′ : 7·9, 8·1 : 299°·6 : 2″·9 : v. w. W., ysh., or ruddy, '50. Sa., 6·75, 7·5, w., blsh., '74. Seabroke, 304°·3, '85. Bin.? De., 7·5, 8.

Stars with Remarkable Spectra and Variable.

Es-Birm. 35. $1^h\ 52{\cdot}3^m$, N 30° 39′ : 7·0 : III. Pickering.

Es-Birm. 50. $2^h\ 22{\cdot}3^m$, N 36° 31′ : 7·7 : YR. III. Du.

15. $2^h\ 29{\cdot}7^m$, N 34° 15′ : 5·6 : III. D'A.

R (Var.). $2^h\ 31{\cdot}0^m$, N 33° 50′ : 5·8 to 11·7. Per., 262^d. Pickering and Es.

Es-Birm. 55. $2^h\ 38{\cdot}0^m$, N 31° 57′ : Neb. with 7·5 *f* R. h. III. Se.

[TRIANGULUM]

Nebula.

598 (M. 33). $1^h\ 28{\cdot}2^m$, N 30° 9′. Very large, faint, ill-defined. Visible from its great size (h. nearly $\frac{1}{2}°$ *n* and *s* in finder). A very curious object, only fit for low powers, being actually imperceptible, from want of contrast, with my 144. Resolved by H. into stars. 'The smallest points imaginable.' E. of Rosse, who only saw it full of knots, found the same spiral arrangement which prevails so wonderfully in many nebulæ; two similar curves, like an S, cross in the centre. Closely *nf* is H. III 150, a small, bright, round neb. D'A., bl., and I or II Class.

URSA MAJOR.

This familiar constellation offers a large field to the persevering observer. It must be borne in mind that it extends far beyond the region occupied by 'the seven stars;' and, from the unmarked character of some parts of it, several telescopic objects will require care in their identification. It seems difficult to ascertain whence this Bear and his companion derived their preposterous length of tail. Dr. Mather, in 1712, tells a curious story, that though the Red Indians did not divide the stars into constellations, they called the stars of Ursa Major 'Paukunawaw,' that is, the Bear, long before they had any communication with Europeans.* H. considered that in '38 ϵ was the leader of the 7; but in '47, by far, η; Fr., in '78, ϵ decidedly *lucida*, and sequence $\epsilon\ \eta\ \zeta\ \alpha\ \beta\ \gamma\ \delta$. ζ was the first spectroscopic Binary discovered. Mrs. Fleming

* I am informed, however, on the highest authority, that in the language of the Cree Indians this word signifies 'Ye are alone· isolated.' The word Bear is 'Muskwa.'

found, in 1888, that the lines were doubled at intervals The period is still uncertain.

Double Stars.

o (β 1067). VIII^h 22·0^m, N 61° 3′ : 3½, 15·2 : 191°·4 : 7″.

Σ 1232. VIII^h 26·3^m, N 66° 37′ : 8, 8·2 : 350°·2 : 31″·1 : w.

Σ 1250. VIII^h 32·9^m, N 52° 9′ : 8·8, 8·8 : 167°·4 : 21″·7 : w.

Σ 1248. VIII^h 33·6^m, N 62° 23′ : 8·3, 8·8 : 208°·7 : 18″·1 : v. w.

Σ 1279. VIII^h 43·5^m, N 39° 58′ : 8·3, 8·3 : 273°·6 : 1″·6 : w.

Σ 1275. VIII^h 43·7^m, N 57° 54′ : 8, 8 : 196°·1 : 2″ : w.

Σ 1280. VIII^h 46·4^m, N 71° 12′ : 7·5, 7·6 : 33°·9 : 7″·4 : ysh. Distance diminishing.

Σ 1293. VIII^h 52·1^m, N 54° 22′ : 7·8, 9 : 92°·2 : 18″·6 w.

ι (OΣ 196). VIII^h 52·4^m, N 48° 27′ : 3·1, 10·3 : 352°·5 : 10″·8 : w., o. Ha., 359°·2 : 8″·8, '89. h. thought *comes* might shine by reflected light. Buffham, very dull for its size. Wa., easy with low, invisible with high powers of $4\frac{3}{10}$. Rapid c.p.m. Bin.

σ^2 (Σ 1306). IX^h 1·6^m, N 67° 32′ : 5, 8·2 : 263°·5 : 4″·6 : grnsh., o., '32. *Comes* very difficult, $3\frac{7}{10}$ in. 80; plain 144. Ha., 224°·4 : 1″·9, '89. Bin.? Sa., *comes* var.; 5 probably so. De., 5·1, 8·7, but estimates of *comes* range from 8 to 10.

Σ 1312. IX^h 3·2^m, N 52° 48′ : 7·7, 8·2 : 147°·9 : 4″·5 : v. w.

Σ 1315. IX^h 4·8^m, N 62° 6′ : 7, 7·2 : 25°·5 : 24″·9 : w.

[URSA MAJOR]

Σ 1318. $11^h\ 6{\cdot}9^m$, N 47° 25′ : 7·5, 8·7 : 245°·1 : 3″·5 : w., o.

Σ 1321. $11^h\ 7{\cdot}8^m$, N 53° 9′ : 7·4, 7·4 : 48°·4 : 20″·1 : y. Seabroke, 61°·5, '84, from p.m.

Σ 1331. $11^h\ 13{\cdot}0^m$, N 61° 47′ : 8, 8 : 152°·6 : 1″·2 : v. w. Ha., 0″·8, '89. *Comes* 11·5, 200°·8 : 11″·4.

OΣ 199. $11^h\ 13{\cdot}8^m$, N 51° 41′ : 6·1, 10·2 : 115° : 5″·9 : w., o.

OΣ 200. $11^h\ 18{\cdot}0^m$, N 52° 1′ : 6·7, 8·4 : 335°·2 : 1″·4 : y., o.

21 (Σ 1346). $11^h\ 18{\cdot}6^m$, N 54° 28′ : 7, 8 : 311° : 5″·7 : w., blsh.

Σ 1349. $11^h\ 22{\cdot}7^m$, N 67° 59′ : 6·8, 8 : 164°·9 : 19″·2 : w.

23 (Σ 1351). $11^h\ 23{\cdot}6^m$, N 63° 30′ : 3·8, 9 : 272°·4 : 22″·8 : grnsh w., ash. Pale y., lilac or violet, '52. Bird, singularly fine, from contrast; *comes* 11 m^s. *np.*

Σ 1350. $11^h\ 24{\cdot}2^m$, N 67° 12′ : 7·2, 7·3 : 246°·3 : 10″·4 : w. 8 m^s. w., distant.

Σ 1358. $11^h\ 24{\cdot}5^m$, N 45° 7′ : 7·3, 8·8 : 152°·6 : 24″·4 : yw., o. Angle increasing from p.m. nearly *f* to *p*. Fl., star 7 m^s. *n*.

Σ 1359. $11^h\ 25{\cdot}8^m$, N 56° 42′ : 8·5, 9·2 : 69°·6 : 7″·7 : o.

θ (β 1071). $11^h\ 26{\cdot}3^m$, N 52° 8′ : 3, 13·7 : 74°·9 : 5″·1. Bin.?

Σ 1362. $11^h\ 28{\cdot}5^m$, N 73° 32′ : 7, 7 : 137°·3 : 4″·9 : w.

Σ 1376. $11^h\ 38{\cdot}7^m$, N 43° 42′ : 8·2, 8·2 : 315°·8 : 5″ : w.

Σ 1381. $11^h\ 44{\cdot}0^m$, N 61° 6′ : 8·5, 8·7 : 217°·6 : 1″·5 : v. w.

υ (OΣ 521). $11^h\ 44{\cdot}0^m$, N 59° 30′ : 4·2, 11·8 : 294°·4 : 11″ : pale y., o. C.p.m.

ϕ (OΣ 208). $11^h\ 45{\cdot}4^m$, N 54° 32′ : 5, 5·6 : 4°·4 : 0″·5. β, 250°·8 : 0″·2, '92. Bin. Glasenapp, per., 91·92 yrs.

[URSA MAJOR]

Σ 1402. $11^h\ 58{\cdot}2^m$, N 55° 59′ : 6·8, 8·0 : 96° : 21″·1 : y., blsh. Fl., star 8 m^g. near.

Σ 1407. $12^h\ 1{\cdot}7^m$, N 64° 56′ : 9, 9·5 : 52°·5 : 4″·9 : o.

Σ 1408. $12^h\ 2{\cdot}8^m$, N 73° 32′ : 8·4, 9·2 : 11°·8 : 3″·3 : w.

Σ 1415. $12^h\ 9{\cdot}9^m$, N 71° 34′ : 6·1, 7 : 167°·1 : 16″·7 : v. w.

Σ 1427. $12^h\ 16{\cdot}0^m$, N 44° 24′ : 7·2, 7·7 : 214°·1 : 9″·5 : w.

Σ 1428. $12^h\ 19{\cdot}7^m$, N 53° 8′ : 7·5, 7·8 : 84°·3 : 3″·8 : w

β 1074. $12^h\ 29{\cdot}5^m$, N 46° 20′ : 6·4, 11·2 : 208°·4 : 2″·1.

Σ 1460. $12^h\ 34{\cdot}8^m$, N 42° 40′ : 8·1, 8·1 : 168°·7 : 3″·3 : w.

Σ 1463. $12^h\ 37{\cdot}0^m$, N 47° 13′ : 8·5, 9 : 258°·3 : 7″·5 : ysh., o.

Σ 1465. $12^h\ 37{\cdot}4^m$, N 45° 9′ : 8·5, 8·8 : 14°·4 : 2″·2 : yw.

Σ 1483. $12^h\ 48{\cdot}7^m$, N 48° 2′ : 8·7, 8·7 : 67°·2 : 3″·3 : w.

Σ 1486. $12^h\ 49{\cdot}1^m$, N 52° 39′ : 7·5, 8·8 : 102°·8 : 28″·3 : y., o.

Σ 1495. $12^h\ 53{\cdot}7^m$, N 59° 27′ : 6, 8·3 : 38°·2 : 34″·5 : yw. *n* of β.

α (β 1077). $12^h\ 57{\cdot}6^m$, N 62° 18′ : 2, 11·1 : 326°·1 : 0″·9, '89; 316°·8 : 0″·8, '91. Rapid Bin. Angular motion 5° per annum. The large star was thought var. by h. Huggins finds it approaching us at 46 to 60 miles per second, while β, γ, δ, ε, ζ are receding at 17 to 21 miles. Klein gives periodical redness; Weber finds 35^d., which has not been confirmed. A distant 8 m^g. violet.

Σ 1510. $13^h\ 2{\cdot}2^m$, N 53° 22′ : 7·1, 8·4 : 341°·9 : 3″·9 : w., ashy.

Σ 1512. $13^h\ 3{\cdot}1^m$, N 63° 3′ : 8, 8·5 : 50°·7 : 9″·4 : w.

Σ 1520. $13^h\ 10{\cdot}3^m$, N 53° 19′ : 6·5, 7·8 : 345°·3 : 13″ : w., blsh.

[URSA MAJOR]

ξ (Σ 1523). $11^h\ 12{\cdot}9^m$, N 32° 6′ : 4, 4·9 : 238°·7 : 1″·7 : o., '26. Earliest calculated Binary (by Savary, 1828). Per., 60·79 yrs., Du. Rapid c.p.m. Ha., 200°·6 : 1″·6, '91. Both w., '48. De., 4, 4·4.

ν (Σ 1524). $11^h\ 13{\cdot}1^m$, N 33° 39′ : 3·7, 10·1 : 146°·6 : 7″·1 : v. y., o. No *comes* $3\frac{7}{10}$-in., '52; seen by Wa. $2\frac{7}{8}$-in., '74. De., 3·8, 9·6.

Σ 1525. $11^h\ 13{\cdot}9^m$, N 48° 1′ : 9, 9 : 177°·7 : 2″·3 : w.

Σ 1533. $11^h\ 16{\cdot}7^m$, N 37° 38′ : 8·2, 8·4 : 172°·8 : 23″·1 : w.

57 (Σ 1543). $11^h\ 23{\cdot}7^m$, N 39° 54′ : 5·2, 8·2 : 10°·7 : 5″·4 : w., ash. Ha., 4°·1, '86. W., ruddy? 8·2 var.? 9 m^g., $9\frac{1}{2}$-in. '52. C.p.m.

Σ 1544. $11^h\ 25{\cdot}7^m$, N 60° 15′ : 7, 8 : 89°·5 : 12″·5 : w.

OΣ 235. $11^h\ 26{\cdot}6^m$, N 61° 38′ : 6, 7·3 : 43°·1 : 1″, '72 : y., r. Ha., 76°·9 : 1″·1, '89. Bin. Do., 94·4 yrs.

Σ 1555. $11^h\ 31{\cdot}0^m$, N 28° 20′ : 6·4, 6·8 : 339°·4 : 1″·2 : w. Ha., 166°·1 : o″·6, '88. Bin.? Sm., *comes* 13 m^g. Engelmann, 9·7 : 142°·4 : 13″·4, '65. Ha., 146°·5 : 21″·2, '88. Sa., beautiful plum col. Sm. says, 'It is situated in a very vacant space to the eye . . . but to the powerful reflectors now in use is in a very ocean of nebulæ.'

Σ 1553. $11^h\ 31{\cdot}2^m$, N 56° 42′ : 7·3, 7·8 : 171°·5 : 5″·3 : w.

Σ 1559. $11^h\ 33{\cdot}2^m$, N 64° 54′ : 6·7, 7·7 : 322°·7 : 2″·1 : w, '31; 7·7 ashy, '36. So Fr., '77.

Σ 1561. $11^h\ 33{\cdot}6^m$, N 45° 40′ : 5·9, 8 : 266° : 10″·5 . ysh. w., ash. Prettily grouped.

Σ 1570. $11^h\ 40{\cdot}2^m$, N 46° 10′ : 8·3, 8·8 : 48°·8 : 10″·7 : w.

Σ 1576. $11^h\ 47{\cdot}7^m$, N 31° 23′ : 8·2, 8·5 : 242°·7 : 5″·2 : v. w.

[URSA MAJOR]

65 (Σ 1579). $11^h\ 49{\cdot}9^m$, N 47° 2′ : 6, 8·3 : 36°·5 : 3″·7 : v. w., bl. Third star 6·5 : 113°·8 : 62″·9 : v. w. Sm. suspects two latter var., and all connected.

OΣ 241. $11^h\ 51{\cdot}0^m$, N 35° 59′ : 6·5, 8·4 : 119°·1 : 1″·4. Perr., 125°·7, '84. Bin.?

β 918. $11^h\ 53{\cdot}0^m$, N 32° 50′ : 6·4, 12·7 : 234°·3 : 7″·3.

β 919. $11^h\ 54{\cdot}1^m$, N 33° 43′ : 6·2, 11·7 : 14°·3 : 4″·6.

Σ 1600. $12^h\ 0{\cdot}5^m$, N 52° 30′ : 7, 8 : 93°·2 : 7″·6 : w.

Σ 1603. $12^h\ 3{\cdot}1^m$, N 56° 2′ : 6·9, 7·3 : 80°·6 : 22″·4 : w.

Σ 1608. $12^h\ 6{\cdot}5^m$, N 53° 59′ : 7·5, 7·7 : 223°·9 : 10″·6 : yw.

Σ 1630. $12^h\ 14{\cdot}0^m$, N 56° 56′ : 8·3, 9 : 166°·8 : 2″·3 : v. w.

Σ 1691. $12^h\ 50{\cdot}7^m$, N 58° 42′ : 8·2, 9 : 276°·5 : 19″ : w.

Σ 1695. $12^h\ 51{\cdot}9^m$, N 54° 38′ : 6·3, 8·2 : 289°·1 : 3″·3 : w., ash.

78 (β 1082). $12^h\ 56{\cdot}5^m$, N 56° 55′ : 6, 9·6 : 74°·6 : 1″·5.

ζ (Σ 1744). $13^h\ 19{\cdot}9^m$, N 55° 27′ : 2·1, 4·2 : 147°·6 : 14″·4 : grnsh. w. This fine pair, which is said to have been discovered by Riccioli, and again noticed, 1700, Sept. 7, by Gottfried Kirch, and his scientific wife, Maria Margareta, are probably travelling together through space, and in very slow orbital motion, it forms a noble group with Alcor, 5 m^s.* (five distant *comites*, Es.), $11\frac{1}{2}'$ distant (the 'rider upon the horse'), and another star, 8 m^s., which, however, is said to have been seen without a telescope. ζ, or Mizar, and Alcor, form a pair to the naked eye, and thus become an excellent object for a beginner, as the telescopic increase of brightness and distance admits of direct comparison; but the inversion of the astronomical eye-piece must be borne

* Brightening? K. Certainly no longer the severe naked-eye test, which it used to be even in the Arabian sky.

in mind, or the identity will be perplexing. ζ was the first pair photographed by Bond, and with very encouraging success.

Σ 1770. XIII^h 33·7^m, N 51° 13′ : 6·4, 7·9 : 121° : 1″·8 : y., ash. Orange, ruddy, clearly divided, 144, $3\frac{7}{10}$-in., '52. 2nd star from η to δ.

Σ 1795. XIII^h 55·3^m, N 53° 35′ : 7, 10·2 : 3°·2 : 7″·6 : v. w., o. Well seen $3\frac{7}{10}$-in. In string of stars reaching from ζ towards coarse group in Boötes. De., 7, 9·5.

Σ 1820. XIV^h 9·8^m, N 55° 47′ : 8·2, 8·5 : 46°·7 : 2″·4 : ysh. Ha., 69°·9, '85.

Stars with Remarkable Spectra and Variables.

ρ. VIII^h 53·5^m, N 68° 1′ : 5·1 : III. Du.

Es-Birm. 292. IX^h 14·4^m, N 57° 7′ : 5·8 : yr. : III. Du.

μ. X^h 16·4^m, N 42° 0′ : 3·1 : ry. : III. Du.

R (var.). X^h 37·6^m, N 69° 18′ : 6–8·2 to 13·2 : Per., 302·1^d. Pogson.

Es-Birm. 318. X^h 38·1^m, N 67° 56′ : 6·2 : ry., Fearnley. IV. Du.

Wide Pair. X^h 46·5^m, N 53° 4′ : 6, 6·2 : or. and orange R. : II, III, in a region rich in stars of Type II and III. Es.

β. X^h 55·9^m, N 56° 55′ : has a Red 8·0 (A 9·0) : III. Var.? 31 sec. p, 4′ n. Es.

73. XII^h 22·8^m, N 56° 16′ : 6 : ry. : III. Du.

T (var.). XII^h 31·8^m, N 60° 2′ : 6–8·5 to 12·2–13 : Per., 257·2^d. At Bonn.

Es-Birm. 357. XII^h 35·8^m, N 56° 23′ : 8·2 : R. III. Es.

S (var.). XII^h 39·6^m, N 61° 38′ : 6·7–8·2 to 10·2–11·5 : Per., 226·1^d. Pogson.

[URSA MAJOR]

83. XIII^h 36·9^m N 55° 12′ : 5·5. Seen by B., 1868, Aug. 6 = δ subsequently fading. Fine or. III. D'A. Es., bright lines?

Nebulæ.

2841 (H. I 205). IX^h 15·1^m, N 51° 24′. Large, oval, bright, with nucleus. D'A., *illustris, prægrandis.* E. of Rosse, like Androm. Neb. Dull object, $3\frac{7}{10}$-in., in fine field with 37, 6 m^s., 1½° *sp θ.* Several pretty little pairs in neighbourhood.

2985 (H. I 78). IX^h 41·4^m, N 72° 45′ : bright. D'A., resolvable?

3031, 3034 (M. 81, 82). IX^h 47·3^m, N 69° 32′. Two nebæ. ½° apart; 81 bright, with vivid nucleus, finely grouped with small stars, two of which are projected upon the haze, to which h. gives nearly 15′ of length. Two little pairs *sp*, making the field very interesting. The nearer is Σ 1387 : 9·5, 9·5 : 269°·6 : 8″·9; the further is Σ 1386 : 8·2, 8·2 : 296° : 2″. 82 (Bode's neb.), curious narrow curved ray. D'A., 7′ × 100″, two nuclei, and sparkling as if resolvable, which 81 is not. Huggins finds both spectra continuous, but deficient at the red end, like the Androm. neb., etc.

3556 (H. V 46). XI^h 5·7^m, N 56° 13′. Large, faint, well-defined, elongated, rather curved; small star in centre. 1° *sf β.*

3587 (M. 97). XI^h 9·0^m, N 55° 34′. Large pale plan. neb.; very remarkable object. h., 2′ 40″, which at distance of 61 Cygni only, would equal 7 times orbit of Neptune. He saw light nearly equable, though with softened edge, and faintly bicentral. E. of Rosse, on the contrary, two large perforations (whence it has been called the 'Owl

Neb'), and an indistinct spiral structure. Before 1850 there was a star in each opening; since one only. Huggins, gas-spectrum 2° *sf* β.

3610 (H. I 270). $11^h\ 12{\cdot}6^m$, N 59° 20′. Bright, not large. D'A., haze round star-like nucleus.

3613 (H. I 271). $11^h\ 12{\cdot}8^m$, N 58° 33′. Elongated; nucleus.

3675 (H. I 194). $11^h\ 20{\cdot}7^m$, N 44° 8′. Large, elongated; star-dust *p*.

3941 (H. I 173). $11^h\ 47{\cdot}7^m$, N 37° 32′. Large in dark nights; central blaze.

4026 (H. I 223). $11^h\ 54{\cdot}3^m$, N 51° 31′. D'A., unusual phænomenon; very unlike other neb. of the region. Star 10 m^s. in centre of slender sharp-pointed ray, 4′ × 20″.

4258 (H. V 43). $12^h\ 14{\cdot}0^m$, N 47° 52′. Large, oval, bright, best defined at sides; nucleus *s*, like Androm. Neb. on small scale. D'A., 10′ × 2½′. Spectrum continuous.

5322 (H. I 256). $13^h\ 45{\cdot}9^m$, N 60° 41′. Bright; nucleus.

URSA MINOR.

This constellation is distinguished by a still more inappropriate length of tail than its larger neighbour, by which, as Sm. observes, it is swung round every twenty-four hours. At its extremity stands the most valuable star in the heavens, Polaris, 1° 14′ from the polar point, which, from the precession of the equinoxes, it will approach as near as 26′ 30″, its nearest, A.D. 2095.

Double Stars.

α (Σ 93). $1^h\ 22{\cdot}0^m$, N 88° 46′ : 2, 9 : 210°·1 : 18″·3 : y., w. D., 9 blsh., as I see it. Common test, but only

suited for small apertures, being easy with anything much exceeding 2 in. D. has proposed it as a general standard, finding that 80 on 2-in. will show it if the eye and telescope are good; he has glimpsed it with $1\frac{3}{10}$-in. achr. Dawson has glimpsed it with 1-in. T. T. Smith sees it with $1\frac{1}{4}$-in. refl. In Dorpat achr. it has been perceived by day. De. gives it 8·4 m^g. Peters, light passage of more than 35 yrs.

Σ 1583. $11^h\ 55{\cdot}3^m$, N 87° 33′ : 7·5, 8·5 : 282°·8 : 11″·1 : v. w., blsh.

β 799. $13^h\ 1{\cdot}7^m$, N 73° 33′ : 6·5, 8·5 : 238°·7 : 0″·6, '81. 245°·3, '91. Bin.

OΣ 262. $13^h\ 7{\cdot}4^m$, N 74° 30′ : 7·3, 8·2 : 182°·5 : 28″ : w., redsh.

Σ 1761. $13^h\ 29{\cdot}5^m$, N 72° 14′ : 8·5, 9 : 72° : 20″·1 : w.

Σ 1771. $13^h\ 34{\cdot}1^m$, N 70° 17′ : 7·8, 8·5 : 70°·6 : 1″·7 : o.

Σ 1798. $13^h\ 55{\cdot}2^m$, N 78° 53′ : 7·5, 9·3 : 16°·3 : 7″·1 : yw., o.

Σ 1849. $14^h\ 20{\cdot}1^m$, N 77° 10′ : 8·5, 9 : 1°·2 : 1″·5 : w.

Σ 1905. $14^h\ 56{\cdot}1^m$, N 5° 53′ : 8·3, 8·3 : 160°·1 : 3″·8 : w.

Σ 1928. $15^h\ 9{\cdot}4^m$, N 72° 50′ : 8·5, 9·2 : 227°·6 : 6″·6 : yw., o.

Σ 3125. $15^h\ 24{\cdot}4^m$, N 67° 24′ : 8·7, 9 : 272°·3 : 2″·2 : o.

π^1 (Σ 1972). $15^h\ 35{\cdot}1^m$, N 80° 47′ : 6·1, 7 : 83° : 30″·1 : ysh. Slowly separating? Easily found *np* ζ.

Σ 1980. $15^h\ 38{\cdot}8^m$, N 81° 23′ : 8·5, 9 : 53°·9 : 10″ : v. w.

π^2 (Σ 1989). $15^h\ 45{\cdot}1^m$, N 80° 18′ : 7·1, 8·1 : 24°·1 : 0″·7 : v. w.

Σ 2034. $16^h\ 0{\cdot}7^m$, N 83° 54′ : 7·5, 8 : 115° : 1″·4 : ysh.

Σ 2066. $16^h\ 24{\cdot}8^m$, N 76° 33′ : 9, 9 : 58°·4 : 5″ : w.

Σ 2179. $17^h\ 21{\cdot}8^m$, N 72° 40′ : 8·2, 8·8 : 213°·3 : 5″·5 : v. w.

[URSA MINOR]

OΣ 340. $17^h\ 32{\cdot}8^m$, N 87° 2′ : 7·8, 8·3 : 237°·2 : 31″·5

Star with Remarkable Spectrum and Variable.

Es-Birm. 399. $14^h\ 10{\cdot}2^m$, N 69° 54′ : 5·3 : yr. : III. Du.

R (var.). $16^h\ 31{\cdot}3^m$, N 72° 28′ : 8·6–9 to 10·5. Irreg. Pickering.

VIRGO.

A constellation especially remarkable for those possessed of adequate optical means, on account of the wonderful *nebulous region*, in which a far greater number of these extraordinary bodies are accumulated than in any other equal area of the heavens, H. having detected within its boundaries no less than 323. Few of them, however, are individually interesting; it is the mysterious thronging together of these objects, whatever may be their nature, that opens such a field for curiosity. They are in general so much alike that I have only adduced a few as specimens. They are profusely scattered over this quarter of the sky; but the region more especially referred to is pretty well defined to the naked eye by the stars ϵ, δ, γ, η and β Virg. and β Leonis.

Double Stars.

Σ 1560. $11^h\ 33{\cdot}3^m$, S 1° 53′ : 6, 10·2 : 280°·6 : 5″·1 : v. y., o. *Comes* glimpsed? $3\frac{7}{10}$-in. Sa., bl. De., 6·2, 9·7.

Σ 1568. $11^h\ 38{\cdot}1$, N 1° 19′ : 8·9, 9·1 : 221°·3 : 9″ : o. Vars.? De., 9·7, 9·8.

Σ 1575. $11^h\ 46{\cdot}8^m$, N 9° 24′ : 7, 8 : 209°·8 : 30″·6 : ysh., w.

Σ 1580. $11^h\ 5c{\cdot}4^m$, N 4° 6′ : 8, 9 : 261° : 8″·8 : w.

[VIRGO]

Σ 1591. $11^h\ 56{\cdot}3^m$, N 0° 14′ : 8, 8 : 353°·8 : 53″·8 : yw. 12^m. ± 50° : ± 20″.

Σ 1593. $11^h\ 58{\cdot}4^m$, S 1° 53′ : 8·3, 8·3 : 18°·2 : 1″·4 : o.

Σ 1604. $12^h\ 4{\cdot}3^m$, S 11° 17′ : 6·5, 9 : 93°·3 : 12″ : w., o. A 7·8 : 96°·9 : 58″ : w., '31. Seabroke, 90°·7 : 37″·6, '88, from p.m.

Σ 1605. $12^h\ 5{\cdot}3^m$, S 1° 41′ : 8, 8·5 : 278°·4 : 23″·5 : w.

Σ 1618. $12^h\ 10{\cdot}0^m$, N 10° 33′ : 8·5, 8·5 : 244°·7 : 25″·8 : w.

Σ 1619. $12^h\ 10{\cdot}0^m$, S 6° 42′ : 7·5, 7·8 : 287°·6 : 7″·8 : w.

Σ 1627. $12^h\ 13{\cdot}0^m$, S 3° 23′ : 5·9, 6·4 : 196°·3 : 20″·1 : v. w. H., equal 1785, 1786. Nf decidedly the largest, '51. Fr., 0·5 m^s. diff., '77. De., 6, 6·6.

Σ 1628. $12^h\ 13{\cdot}6^m$, N 12° 22′ : 8·5, 8·7 : 239°·3 : 9″·3 : w.

Σ 1635. $12^h\ 16{\cdot}0^m$, S 10° 55′ : 7·7, 8·7 : 173°·5 : 13″·4 : w.

17 (Σ 1636). $12^h\ 17{\cdot}5^m$, N 5° 52′ : 6·2, 9 : 336°·7 : 19″·3 : grnsh. w., o. Ball, rose, blsh., '51. Bird, w., bl. De., 6, 8·9 : y., purple. Σ, c.p.m. Sa., 2 neb. *f*, a little *s*; brighter G. C. 4324.

Σ 1647. $12^h\ 25{\cdot}5^m$, N 10° 17′ : 7·5, 7·8 : 202° : 1″·2 : w. Ha., 219°·8, '85.

Σ 1649. $12^h\ 26{\cdot}4^m$, S 10° 31′ : 7·2, 8 : 194°·1 : 15″·2 : w.

Σ 1659. $12^h\ 30{\cdot}6^m$, S 11° 28′ : 8, 8·1 : 351°·9 : 27″·1 : v. w. 11 m^s., 68°·9 : 30″·9. A B fixed, C separating, now about 37″. De. notices that this triangularly arranged triple is within a large triangle, 7·0, 7·2, 9·5.

Σ 1661. $12^h\ 31{\cdot}0^m$, N 11° 58′ : 8·5, 8·5 : 226° : 2″·6 : w. Ha., 235°·9, '87.

Σ 1665. $12^h\ 33{\cdot}5^m$, S 4° 46′ : 8·5, 9 : 97° : 8″·8 : w.

Σ 1668. $12^h\ 35{\cdot}8^m$, N 9° 23′ : 7·5, 8 : 196°·9 : 1″·7 : v. w.

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γ (Σ 1670). XII^h 36·6^m, S 0° 54′ : 3, 3 : 277°·9 : 2″·4 : ysh., '25. This wonderful pair has been widening ever since they closed up out of all telescopic reach in 1836 (except at Dorpat, where 848 still showed elongation 151°·6 : 0″·3), and a very moderate instrument will now suffice for them. Ha., 153°·1 : 5″·6, '91. Bin. Per., 180 yrs. Do. Ha. says distance varies from 0″·5 to 6″·3. Σ thought them alternately var. in brightness, with possible period of at least several yrs. Humboldt suggested slow axial rotation in each. β, *comes*, 14·5 : 159°·4 : 53″·1, and pair in field *p*, 8·5, 11 : 315°·8 : 1″·2.

31 (β 924). XII^h 36·9^m, N 7° 22′ : 5, 11·5 : 29° : 3″·9.

Σ 1677. XII^h 40·1^m, S 3° 20′ : 7, 8 : 348°·4 : 15″·9 : yw.

Σ 1681. XII^h 44·5^m, N 4° 22′ : 8·5, 8·5 : 193°·5 : 8″·5 : w.

Σ 1682. XII^h 46·2^m, S 9° 48′ : 6·7, 9 : 308°·8 : 33″·7 : y., o. Topaz, blsh., or purp., '51. Approaching?

Σ 1686. XII^h 48·0^m, N 15° 34′ : 8, 8·2 : 187°·6 : 5″·4 : w. (Heis in Leo). Vars.?

Σ 1689. XII^h 50·5^m, N 12° 2′ : 6·7, 9 : 6·7, 9 : 198°·4 : 28″·7 : ysh., blsh.

Σ 1690. XII^h 51·5^m, S 4° 19′ : 7·4, 8·9 : 149°·8 : 5″·9 : w., blsh.

44 (Σ 1704). XII^h 54·6^m, S 3° 16′ : 6, 11·2 : 53°·0 : 21″·3 : w., o.

46 (A. G. Clark). XII^h 55·5^m, S 2° 49′ : De., 5·3, 8·1 : 149°·5 : 1″·2 : y., ash, or olive. β *comes* 13 : 116°·9 : 33″·9.

48 (β 929). XII^h 58·7^m, S 3° 7′ : 6·2, 6·2 : 229°·4 : 0″·5, '79. 221°·2, '91. Bin.?

Σ 1712. XII^h 58·8^m, N 9° 59′ : 9, 9·4 : 336°·6 : 8″·6 : o.

Σ 1719. XIII^h 2·2^m, N 1° 7′ : 7·3, 7·8 : 3°·1 : 7″·2 : v. w., yw.

θ (Σ 1724). XIII^h 4·8^m, S 5° 0′ : 4, 9 : 344° : 7″·1 : w., o.

[VIRGO]

Comes grnsh. or blsh., '56. h. and South called 9 a very severe test for 5-ft. telescope, '24. Glimpsed by Wa., 2½-in., '75. Another *comes*, De., 10 : 297°·6 : 75″·5. Gore, both well seen, 3-in.

β 931. XIII^h 5·8^m, N 13° 51′ : 6·7, 11·8 : 204°·9 : 4″·9.

54 (*Hh.* 412). XIII^h 8·0^m, S 18° 18′ : Cincinnati, 7, 7·2 : 33°·8 : 5″·1. To me pale y.? Pale bl.? '52. Sa., ysh., rdsh., '76. Fr., y., bl., contrast, '77. Sa., 11 m^s. *sp.*

σ 434. XIII^h 9·7^m, S 10° 50′ : β, 7, 8 : 52°·5 : 64″·6, '81. β notes that the principal star has p.m. of 0″·372 annually. Fr., w., bl., '77. Other stars in group.

Σ 1734. XIII^h 15·6^m, N 3° 28′ : 7·2, 7·9 : 198°·1 : 0″·7 : w., '30. Ha., 191°·6 : 1″, '87. Bin. Se., 7 w., 8·2 changeable?

Σ 1738. XIII^h 17·9^m, S 14° 24′ : 8·2, 8·3 : 283°·5 : 4″·1 : w.

β 610. XIII^h 18·5^m, S 20° 25′ : 6·8, 10·5 : 18°·3 : 4″.

Σ 1740. XIII^h 18·6^m, N 3° 14′ : 7·1, 7·2 : 76°·3 : 27″·3 : w.

Σ 1742. XIII^h 19·2^m, N 1° 55′ : 7·4, 7·9 : 351°·1 : 1″·3 : yw.

β 114. XIII^h 29·0^m, S 8° 6′ : 7·6, 8 : De., 137°·1 : 1″·5.

Σ 1757. XIII^h 29·2^m, N 0° 12′ : 7·8, 8·9 : 21° : 1″·5 : w. Elong.? '51. Ha., 73°·7 : 2″·4. Rectilinear motion? '91. Morton, *comes* 11·5 est. 160° : 40″.

Z (β 932). XIII^h 29·3^m, S 12° 42′ : 6·1, 6·6 : 81°·2 : 0″·5. Believed by Schm., '66, to be var. 5–8, but mentioned by Persian astronomer, Sûfi, 10 cent. Gould also found var. Sawyer none; and it has been rejected by Chandler. β *comes* 12·4 : 155°·2 : 23″·8.

81 (Σ 1763). XIII^h 32·3^m, S 7° 22′ : 7·5, 7·5 : 39° : 2″·7 : v. w. Sa., minute bl. *comes np.*

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Σ 1764. XIII^h 32·6^m, N 2° 53′ : 7, 8·7 : 31°·7 : 16″ : y., ash.

Σ 1773. XIII^h 36·6^m, N 8° 6′ : 9, 9, 9·5 : 209°·8, 102°·4 : 27″·9, 57″·1 : o.

84 (Σ 1777). XIII^h 38·1^m, N 4° 2′ : 5·8, 8·2 : 235°·4 : 3″·4 : y., v. bl. Difficult, $3\frac{7}{10}$-in.; Wa., $2\frac{7}{8}$, '74. C.p.m.

Σ 1775. XIII^h 38·3^m, S 3° 46′ : 7, 9·7 : 335°·7 : 27″·7 : ysh., o. 9·7 seen much out of focus with strong moon, '52; Fr., 9·5, '77. De., 6·5, 10.

Σ 1781. XIII^h 40·1^m, N 5° 37′ : 7·8, 8·2 : 240°·4 : 1″·4 : yw. Tarrant, 265°·1 : 1″, '87. Bin.

86 (Σ 1780, rej.). XIII^h 40·6^m, S 11° 56′ : β, 5·8, 10·5 : 164°·6 : 27″·2. β, each double (β 935) 5·8, 10 : 299°·6 : 1″·7, and 10·5, 11·2 : 275°·9 : 2″·2.

Σ 1788. XIII^h 49·6^m, S 7° 34′ : 6·7, 7·9 : 54°·0 : 2″·4 : w. Tarrant, 73°·8, '89. Clearly divided, '80. Heis, 6 m^g.

Σ 1790. XIII^h 50·9^m, S 4° 8′ : 8·6, 8·7 : 240°·8 : 5″·3 : w.

τ (H*h*. 432). XIII^h 56·6^m, N 2° 2′ : South, 4, 9 : 290° : 79″·3.

Σ 1799. XIII^h 59·6^m, S 6° 5′ : 8, 9·2 : 293° : 4″ : w., blsh.

Σ 1805. XIV^h 5·0^m, N 4° 30′ : 8·4, 8·5 : 30°·5 : 4″·6 : w.

Σ 1807. XIV^h 6·1^m, S 2° 51′ : 7·8, 8 : 25°·8 : 7″·1 : yw. Query angle 28°·5 ?.

β 225. XIV^h 8·9^m, S 19° 31′ : De., 6, with double *comes* (7·3, 8·2 : 101°·9 : 1″·4) at 295°·5 : 35″.

Σ 1819. XIV^h 10·3^m, N 3° 36′ : 7·9, 8 : 84°·9 : 1″ : ysh. Ha., 11°·1 : 1″·3. Rectilinear motion? '87.

β 116. XIV^h 14·1^m, S 13° 14′ : 7·7, 8·2 : De., 277°·4 : 3″.

Σ 1842. XIV^h 21·9^m, N 4° 9′ : 8·7, 8·7 : 10°·9 : 2″·8 : w. Ha., 15°·7, '87.

φ (Σ 1846). XIV^h 23·1^m, S 1° 47′ : 5·2, 9·7 : 108°·8 : 3″·7 :

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y., o. Tarrant, 110°·1 : 4″·4, '89. *Comes* not seen, '54; Wa., 2⅞-in., '74. De., 9·4.

Σ 1869. XIV^h 37·4, S 5° 33′ : 8, 9 : 132°·6 : 26″ : w.

Σ 1881. XIV^h 42·0^m, N 1° 23′ : 7, 9·3 : 357°·9 : 3″·6 : v. w., ash.

β 1113. XIV^h 42·4^m, N 2° 28′ : 6·2, 11·8 : 137°·1 : 4″·5.

Σ 1904 XIV^h 59·1^m, N 5° 53′ : 7, 7 : 346°·4 : 9″·6 : v. w.

Stars with Remarkable Spectra and Variables.

1. XI^h 33·3^m, N 8° 42′ : 6·1 : III. D'A.

3. XI^h 40·7^m, N 7° 6′ : 4·3 : III. D'A.

Es-Birm. 337. XI^h 53·1^m, N 4° 2′ : 7·5 : R. Webb. III. Vogel.

X (var.). XI^h 56·7^m, N 9° 38′ : 8–10 to 12 : Per., 340^d.? Peters.

T (var.). XII^h 9·5^m, S 5° 29′ : 8–8·8 to 10–13·5 : Per., 339·5^d. Boguslawski.

Es-Birm. 350. XII^h 20·1^m, N 1° 19′ : R. Bessel. IV. Se. Var. 7·8 to 8·8. Es.

Es-Birm. 352. XII^h 25·3^m, N 4° 58′ : 8·5 : R. Rosse. III. D'A.

Y (var.). XII^h 28·7^m, S 3° 52′ : 8–9·4 to 11·5–13 : Per., 218·8^d. Henry.

R (var.). XII^h 33·4^m, N 7° 32′ : 6·5–8 to 9·7–11 : Per., 145·47^d. Harding.

35. XII^h 42·8^m, N 4° 7′ : 6·7 : III. Vogel.

U (var.). XII^h 46·0^m, N 6° 6′ : 7·7–8·1 to 2·2–12·8 : Per., 207^d. Harding.

ψ. XII^h 49·1^m, S 9° 0′ : 5·2 : III. D'A.

δ. XII^h 50·6^m, N 3° 56′ : 3 : III. '*Bellissima.*' Se.

σ. XIII^h 12·5^m, N 6° 0′ : 5·2 : III. Vogel.

α (Spica). XIII^h 19·9^m, S 10° 38′ : 1. Was found by Vogel,

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by the doubling of the lines in its spectrum, to be a spectroscopic Binary. Period, 4 days.

W (var.). XIII^h 20·9^m, S 2° 51′ : 8·7–9·2 to 9·8–10·4 : Per., 17·2711^d. Schönfeld.

V (var.). XIII^h 22·6^m, S 2° 39′ : 8–9 below 13 : Per., 250·5^d. Goldschmidt.

74. XIII^h 26·8^m, S 5° 44′ : 5·1 : III. Vogel.

S (var.). XIII^h 27·8^m, S 6° 41′ : 5·7–7·8 to 12·5 : Per., 376·4^d. Hind.

82. XIII^h 36·4^m, S 8° 12′ : 5·7 : III. D'A.

RR (var.). XIII^h 59·6, S 8° 43′ : above 11, below 14 : Per., 217^d. Peters.

Z (var.). XIV^h 5·0^m, S 12° 50′ : 9·5–11, below 14 : Per., 305^d. Palisa.

Nebulæ.

4192 (M. 98). XII^h 8·7^m, N 15° 27′. Long ray. h., 10′; D'A., nucleus.

4216 (H. I 35). XII^h 10·8^m, N 13° 42′. Long, shuttle-like nucleus. E. of Rosse, 15′.

4254 (M. 99). XII^h 13·7, N 14° 58′. E. of Rosse, wonderful spiral. Key resolvable 18-in. 'With' spec. So D'A.

4303 (M. 61). XII^h 16·8, N 5° 2′. Faint; bright centre. E. of Rosse, spiral.

4406 (M. 86). XII^h 21·1^m, N 13° 30′. h., very bright, resolvable? *nf*, G. C. 4435, 4438. In this neighbourhood Lowe sees 7 nebulæ in large field with fine 15½-in. Calver.

4472 (M. 49). XII^h 24·7^m, N 8° 33′. Bright; D'A., *illustris*, *grandis*, and resolved. Faint haze in beautiful position between two 6 m^s. stars. Bright open pair *s*, $3\frac{7}{10}$.

4501 (M. 88). XII^h 26·9^m, N 14° 58′. Long, pale; D'A.

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7′ × 1½′; nucl. In wonderful nebulous region. h., ray 8′ × 1′. E. of Rosse, spiral? Marvellous region as swept with 64; identification difficult.

4526 (H. I 31). XII^{h} 29·0^{m}, N 8° 15′. h., very bright.

4594 (H. I 43). XII^{h} 34·8^{m}, S 11° 4′. Long. h., 5′ × 30″, nucl. and dark cleft. Beautiful low-powered field; fine and singular 7 m^{s}. group *np*.

4649 (M. 60). XII^{h} 38·6^{m}, N 12° 6′. Double; *p* extremely faint. Not seen $3\frac{7}{10}$. In large field with M. 59 *np*, and H. II 70 *sp*, like a hazy star.

4697 (H. I 39). XII^{h} 43·4^{m}, S 5° 15′. h., very bright.

4699 (H. I 129). XII^{h} 43·9^{m}, S 8° 7′. h., very bright.

4754, 4762 (H. II 74, 75). XII^{h} 47·9^{m}, N 11° 46′. In one field. 4762 like a paper kite; beautifully grouped with 3 stars. D'A. and E. of Rosse, long bright ray, nucl.

5634 (H. I 70). XIV^{h} 24·4^{m}, S 5° 32′. Small. h., resolved, stars 19 m^{s}. D'A., beautiful bl. with Red star (Es-Birm. 404), 8 m^{s}. (var.? Es.) *sf*. Prettily grouped.

5846 (H. I 128). XV^{h} 1·4^{m}, N 1° 59′. h., very bright.

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Two little modern asterisms, arranged by Hevel. Grand sweeping; few coloured stars.

Double Stars.

1 (Σ 2445). XIX^{h} 0·5^{m}, N 23° 11′ : 6·3, 8 : 263°·5 : 12″·1 : v. w., ashy.

Σ 2455. XIX^{h} 2·6^{m}, N 22° 1′ : 7·2, 8·3 : 144°·5 : 4″·9 : v. w., o. Tarrant, 92°·3 : 3″·6, '87.

Σ 2457. XIX^{h} 2·9^{m}, N 22° 25′ : 7·2, 8·7 : 201°·3 : 10″·1 : w., o.

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2 (β 248). XIX^h 13·5^m, N 22° 51′ : De, 5·8, 9·6 : 124°·1 1″·8 : w., bl.

Σ 2499. XIX^h 14·3^m, N 21° 46′ : 8·1, 8·4 : 329°·4 : 2″·6 : v. w.

OΣΣ 181. XIX^h 16·0^m, N 26° 28′ : De, 6·2, 6·3 : 5° : 54″·6 : ry., azure w. Es., lovely.

Σ 2504. XIX^h 16·6^m, N 18° 57′ : 6·4, 8·1 : 288°·3 : 8″·9 : yw., blsh.

Σ 2515. XIX^h 20·2^m, N 21° 19′ : 8, 9 : 18°·3 : 18″·7 : v. w., o. Ha., 26°·1 : 11″·9, '88.

Σ 3111. XIX^h 20·8^m, N 21° 39′ : 9, 9·3 : 120°·1 : 2″·5 : o.

Σ 2523. XIX^h 22·5^m, N 20° 58′ : 7·3, 7·4 : 151°·5 : 6″·2 : v. w.

6, 8. XIX^h 24·6^m, N 24° 28′ : 4, 5 : deep, and pale y., in beautiful field 3° nearly s from β Cygni. 4 is Type III.

Σ 2540. XIX^h 28·9^m, N 20° 11′ : 7·5, 9 : 149°·7 : 5″·1 : w., blsh.

9 (β 1130). XIX^h 30·2^m, N 19° 26′ : 5·5, 14 : 31°·3 : 9″·5.

Σ 2548. XIX^h 32·3^m, N 24° 47′ : 8, 9 : 100°·8 : 9″·3 : w.

Σ 2584. XIX^h 44·1^m, N 21° 57′ : 8·5, 8·5 : 299°·2 : 1″·9 : w.

OΣ 388. XIX^h 48·1^m, N 25° 39′ : 7·6, 7·6 : 140°·5 : 3″·7. Triple, 8·8 : 139°·1 : 26″·6.

Σ I 48. XIX^h 49·0^m, N 20° 5′ : 6·7, 6·8 : 147°·9 : 42″·2 : w. Another pair (Σ 2595, rej.) p, followed by a minute star (5½ in.), makes up a pretty group.

16 (OΣ 395). XIX^h 57·8^m, N 24° 39′ : 5·8, 6·2 : 71°·3 : 0″·6. Ha., 100°·2, '88.

Σ 2631. XX^h 2·8^m, N 20° 49′ : 8, 9·4 : 342°·1 : 4″·4 : ysh., o. Redsh.

Σ 2655. XX^h 9·7^m, N 21° 55′ : 7·5, 7·5 : 3° : 6″·1 : w.

β 983. XX^h 11·0^m, N 25° 17′ : 6·1, 10·2 : 154°·9 : 0″·9.

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P. XX 113. xx^h $18{\cdot}4^m$, N 23° 45′ : Sm., 8, 14 : β 221°·6 : 28″·8.

Σ 2692. xx^h $26{\cdot}8^m$, N 26° 9′ : 8, 9 : 302° : 25″·7 : w.

Σ 2695. xx^h $27{\cdot}7^m$, N 25° 28′ : 6·2, 8 : 76°·5 : 0″·8 : w. Perrotin., 1″·2, '83.

Σ 2698. xx^h $29{\cdot}1^m$, N 27° 46′ : 8·1, 9 : 305°·6 : 4″·1 : v. w.

Σ 2724. xx^h $40{\cdot}1^m$, N 23° 34′ : 8·2, 8·3 : 325°·7 : 2″·5 : 0.

Σ 2761. xxi^h $3{\cdot}1^m$, N 24° 4′ : 8·7, 9·2 : 112°·2 : 5″·4 : v. w.

Σ 2769. xxi^h $6{\cdot}0^m$, N 22° 3′ : 6·5, 7·5 : 300°·8 : 17″·8 : w., '30.; 7·5, blsh., 9 in. spec., '71; so Fr., '76.

β 447. xxi^h $19{\cdot}7^m$, N 24° 54′ : 6·2, 12·7 : 330°·4 : 8″·5.

Stars with Remarkable Spectra and Variables.

Es-Birm. 586. xix^h $0{\cdot}6^m$, N 23° 10′ : 8·7 : pale R. Webb.

Es-Birm. 589. xix^h $4{\cdot}5^m$, N 24° 1′ : 7 : R. Con. des Temps. III. Var.?

Es-Birm. 597. xix^h $15{\cdot}3^m$, N 22° 23′ : 7·7 : R. Webb. III. Du.

11. xix^h $43{\cdot}5^m$, N 27° 4′. Anthelm's Nova, 3rd m^s. disappearing after 2 yrs., and not seen since.

Es-Birm. 624. xix^h $43{\cdot}9^m$, N 22° 31′ : 7·7 : red or. Webb. III. Es.

S (var.). xix^h $44{\cdot}3^m$, N 27° 2′ : 8·4–8·9 to 9–10 : Per., $67{\cdot}50^d$. Hind.

Es-Birm. 677. xx^h $30{\cdot}4^m$, N 27° 58′ : E. of Rosse R. star in cl. Es. Var.? 8·7–9·3. III. Another 9·5, R. *sp.*

Es-Birm. 690. xx^h $44{\cdot}4^m$, N 22° 37′ : 8·0 : III. D'A.

T (var.). xx^h $47{\cdot}2^m$, N 27° 52′ : 5·5 to 6·5 : Per., $4{\cdot}4362^d$. Sawyer.

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R (var.). xx^h $59{\cdot}9^m$, N 23° 25′ : 7·5–8·5 to 12·5–13·6 : Per., $136{\cdot}9^d$. At Bonn.

Nebula.

Some of my readers may perhaps feel that I have allotted an undue proportion of space to minute and inconspicuous objects. It may be so. I may have erred in supposing that others might receive as much pleasure as myself from their contemplation: yet a multitude, especially of the minuter pairs, have been passed by, as well as a great mass of remarks on the beauty or singularity of those which have been selected. But, should I have failed in communicating to others a portion of my own interest as to some parts of this list, it will be closed with a nebula which I think will not be found disappointing.

6853 (M. 27). xix^h $55{\cdot}3^m$, N 22° 27′ The 'Dumb Bell' Nebula, just visible with a 1¼ in. finder. In a rich field we find two oval hazy masses in contact, of which *p* seems to me the brighter, as it did to H. His reflector failed to resolve it, but showed the dark notches (which, as Darby remarks, are usually represented too deep) filled in and made protuberant by faint luminosity, converting the whole figure into an ellipse. The Earl of Rosse's 3-ft. speculum was thought to reach its starry components: his 6-ft. surrounds it with an external ring having a neck like a retort. Bond's achr. also seemed to resolve it, but there, as in d'A's figure, the form shown in small instruments is lost. The minute stars in it, of which I picked out two or three with 5½-in. achr. and 8-in. silvered glass, and Denning sees 7 with 10-in. spec., are admirable tests for superior telescopes. Ingall has claimed 18 with 5½-in. dialyte, from keenness

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of vision, and Se has drawn many more. They seem, however, to be merely part of the host of the Galaxy; for Huggins finds there, by simultaneous comparison, nothing but luminous gas. And here the magnificent apostrophe of Kepler, which closes his speculations on the habitability of our own Sun, may well express our feelings, and form at the same time a most appropriate conclusion to the varied scenes which have passed in review since we commenced these pages:—

'Abrumpo consultò et somnum et speculationem vastissimam: tantum illud exclamans cum Psalte Rege:

'Magnus Dominus noster, et magna virtus ejus, et sapientiæ ejus non est numerus: laudate eum cœli, laudate eum Sol, Luna, et Planetæ, quocunque sensu ad percipiendum, quâcunque linguâ ad eloquendum Creatorem vestrum utamini: laudate eum harmoniæ cælestes, laudate eum vos harmoniarum detectarum arbitri: lauda et tu anima mea Dominum Creatorem tuum, quamdiu fuero: namque ex ipso et per ipsum et in ipso sunt omnia, καὶ τὰ αἰσθητὰ καὶ τὰ νοερά; tam ea quæ ignoramus penitus, quam ea quæ scimus, minima illorum pars; quia adhuc plus ultra est. Ipsi laus, honor, et gloria in sæcula sæculorum! AMEN.'

APPENDIX I.

STARLESS FIELDS.

Several of these curious vacancies, through which we seem to gaze out into an uninterrupted infinity, have been mentioned by h.; but an extended list is to be found in the Cape Observations of his son, from which the following are selected as favourably situated for observation in northern latitudes. They are interesting not only from their peculiar aspect, but from the facility which they obviously afford for the detection of variable stars. The places have not been altered from the last edition, it being unnecessary for this class of Objects.

No.	R. Asc.	Dec.	Constell.	No.	R. Asc.	Dec.	Constell.
	h. m.	° ′			h. m.	° ′	
1	1 37	S 4 27	Cet.	18	XVI 33	S 24 0	Scorp.
2	1 48	S 10 38	—[1]	19	XVI 33	S 23 53	—
3	II 53	S 5 49	Erid.	20	XVI 40	S 21 4	Oph.
4	IX 37	N 17 16	Leo.	21	XVI 46	S 15 22	—
5	XVI 11	S 24 27	Scorp.[2]	22	XVII 15	S 26 45	—
6	XVI 13	S 21 24	—[3]	23	XVII 21	S 26 48	—
7	XVI 15	S 23 2	—[4]	24	XVII 22	S 26 40	—[8]
8	XVI 16	S 19 14	Oph.[5]	25	XVII 22	S 26 14	—
9	XVI 16	S 23 41	—[6]	26	XVII 26	S 8 47	—
10	XVI 17	S 23 10	—[7]	27	XVII 26	S 25 42	—
11	XVI 24	S 23 10	Scorp.	28	XVII 27	S 25 59	—
12	XVI 24	S 23 32	—	29	XVII 28	S 25 52	—
13	XVI 26	S 22 58	—	30	XVII 32	S 9 23	—[9]
14	XVI 26	S 24 31	—	31	XVII 56	S 4 47	Scrp.
15	XVI 26	S 24 12	—	32	XVIII 10	S 7 44	—
16	XVI 29	S 24 21	—	33	XVIII 16	S 7 8	—
17	XVI 30	S 23 7	Oph.				

[1] Near ζ, $3^m f$, 18′ *n*.—[2] Sa., 6½-in. spec. minute stars.—[3] Ditto.—[4] Near ρ Oph., $3^m p$, 8′ *n*.—[5] Near ψ, $1^m p$, 31′ *n*.—[6] Near ρ, $3^m p$, 31′ *s* (see [2] and [3]).—[7] To 24° 18′; $1{\cdot}4^m p$ ρ. h., 'not the smallest star. Sky perfectly pure and superb.'—[8] To 23° 58′. —[9] To 26° 56′.—[10] Near μ, $30^s f$, 1° 20′ *s*. h., with long attention one 17 ms. star.

APPENDIX II.

SOUTHERN TELESCOPIC OBJECTS.

The following selection of objects for students in S. latitudes, which in the IVth Edition was enlarged and improved by the kindness of Messrs. Franks and Sadler, has been further enlarged. The

objects have been chosen without that personal knowledge which is so important when an author's materials are to be adapted to a purpose not contemplated by himself; and this disadvantage will, it is hoped, be regarded in extenuation of defective and unequal execution. The arrangement is that of R.A., without reference to constellations, which in the Southern have not an equal claim to respect, on the ground of ancient custom, with those of the Northern hemisphere.

(A) DOUBLE STARS.

The data in the following list are taken principally from the measures of Russel. The *numbers* are those of h. Positions and distances without decimal point are estimations only. β's stars are followed by his measures.

Name.	R.A.	Dec. S.	Pos.	Dist.	Mags.
	h. m.	° ′	°	″	
κ^1 Sculp. (β 391)	0 4·3	28 33	110	0·7	6, 6
β Touc.	0 27·0	63 31	170·0	27·5	4, 4
ξ Appar.	0 28·9	35 32	166·0	5·2	6, 8
ξ Phœn.	0 37·2	57 3	252·5	12·6	6, 11
η Phœn.	0 38·9	58 1	217·7	20·1	4·5, 11
λ Touc.	0 48·4	70 3	80·2	20·7	7, 8
3416	0 59·3	60 37	126·1	4·7	8, 8[1]
β 735	1 0·0	34 4	220·3	8·7	6, 10·5
β Phæn.	1 1·6	47 15	18	30	3·5, 11
ζ Phæn.	1 4·2	55 47	245·7	5·3	5, 9
κ Touc.	1 12·4	69 24	355·0	5·2	5·5, 8
h. 3426	1 13·6	66 56	339·0	1·7	6·5, 8
h. 3447	1 31·5	30 25	75	3	6, 7
6 (P) Erid.	1 36·0	56 43	122·3	3·6	6, 6[2]
Santiago 14	1 39 3	82 47	53·0	6·0	6·5, 8
ε Sculpt.	1 40·9	25 33	61·1	4·3	5, 9[3]
ω Forn.	11 29·5	28 40	244·4	10·8	7, 9[4]
β 261	11 39·4	28 20	100·4	2·9	7, 8·5[4]
3527	11 39·5	40 57	43 6	1·4	7, 7
υ Forn.	11 44·6	37 49	146·2	5·2	6, 8
γ Forn. (β 877)	11 45·4	24 58	144·4	11·5	6, 13
h. 3536	11 46·2	36 15	12·6	6	6, 12
θ Erid.	11 54·5	40 42	84·7	8·3	3·5, 5·5
12 Erid.	III 7·8	29 23	326·6	2·0	3, 8[5]
h. 3568	III 10·9	79 22	223·9	15·2	6·6, 8·6
h. 3592	III 42·0	54 36	11·5	5·3	6·5, 10
f Erid.	III 44·9	37 56	205·2	7·0	5, 5

Name.	R.A.	Dec. S.	Pos.	Dist.	Mags.
	h. m.	° ′	°	″	
h. 3621	IV 1·3	34 6	110	15	8·5, 8·5
θ Retic.	IV 16·5	63 30	6·3	5·2	6, 9
h. 3670	IV 32·5	63 2	98·9	32·4	6, 8·5
h. 3679	IV 35·6	62 17	350	20	7, 12[6]
ι Pict.	IV 48·7	53 38	57·5	11·9	5·7, 6·5
γ Caeli (β 750)	V 1·4	35 37	316·0	2·7	4·5, 8·7
h. 3728	V 5·3	41 21	259·0	9·5	5·5, 10
h. 3735	V 9·8	32 2	151	8	8, 8
h. 3760	V 22·3	35 26	223·7	7·0	7, 7
θ Pict.	V 22·5	52 24	106·4	38·6	7, 7
h. 3834	VI 1·8	45 5	230·6	3·0	6, 10
h. 3835	VI 2·2	48 27	2·1	2·9	8, 8[7]
h. 3857	VI 20·5	36 39	258, 66	12, 70	5·5, 12, 7
h. 3858	VI 22·1	33 58	314	3	7·5, 8
λ Canis (β 753)	VI 24·1	32 31	47·2	1·3	5·8, 7·7
Russell 63	VI 27·4	50 10	320	10	6, 9
h. 3871	VI 30·2	29 33	353	10	7·5, 8
β 755	VI 31·9	36 42	253·1	0·7	6, 7[8]
V Puppis.	VI 36·0	48 8	319·3	13·0	6½, 9
Δ 32	VI 38·9	38 18	277·8	8·0	7, 9
Δ 39	VII 1·7	59 2	74·9	2·4	6, 7[9]
h. 3928	VII 1·9	34 37	156·3	3·2	5, 7[10]
β 757	VII 8·9	36 23	67·7	2·6	6·5, 8
γ Volant.	VII 9·6	70 20	299·7	13·4	4·5, 7
π Arg.	VII 13·6	36 55	212·7	57·4	3, 8
h. 3957	VII 18·7	35 44	193 8	7·0	6, 7
h. 3966	VII 21·2	37 5	141·6	6·6	7, 8
Δ 49	VII 25·0	31 38	52	10	6, 7
σ Arg.	VII 26·1	43 6	74·4	22·1	5, 11
ζ Volantis	VII 43·0	72 22	114·8	17	5, 9
h. 4025	VII 55·4	48 58	69·9	5·3	5, 11[11]
h. 4028	VII 56·4	49 42	46·2	16·1	8, 8
h. 4030	VII 57·3	41 2	346·1	27·2	8, 10[12]
β 203	VII 58·5	27 18	245·1	7·1	7, 9[4]
κ Puppis.	VIII 6·4	42 21	80	6	7, 8
γ Arg.	VIII 6·4	47 2	220·4	41·4	2·5, 5[13]
Σ Volant.	VIII 7·6	68 19	23·1	6·5	5, 8
h. 4058	VIII 9·7	35 35	190	4	6, 7
h. 4063	VIII 10·9	37 3	349·7	18·1	7, 9
h. 4069	VIII 11·2	45 32	253·7	32·3	6, 9
Russel 80	VIII 13·8	62 36	62·3	2·6	6, 10
h. 4104	VIII 25·9	47 36	241·0, 38·8	4·0, 18·5	6, 8, 10
Δ 70	VIII 25·9	44 26	348·1	5·1	6, 9
h. 4115	VIII 33·6	33 23	156, 21	20, 40	6·5, 12, 13
h. 4125	VIII 35·5	62 30	233·7	8·0	5, 10

Name.	R.A.	Dec. S.	Pos.	Dist.	Mags.
	h. m.	° ′	°	″	
h. 4128	VIII 37·1	59 58	215·2	1·3	7, 8
h. 4127	VIII 37·3	46 18	58	30	5, 11
Russel 85	VIII 53·3	52 20	240·5	3·5	6, 9
β 410	IX 5·4	25 14	161·2	1·7	7·6, 8·6
ε Pyx.	IX 5·7	29 58	157·1	17·7	6·5, 9·5 [4]
h. 4188	IX 8·8	43 12	285·4	2·4	7, 8
h. 4213	IX 23·0	61 31	326·3	8·8	6 5, 10
h. 4220	IX 30·2	48 34	204·1	1·6	6, 6·5
ι Arg.	IX 44·6	64 36	124·9	5·0	3, 8
Δ 81	IX 50·4	44 49	235·6	5·0	7, 9
T Vel.	X 17·2	55 32	102·9, 189·6	7·0, 36·8	5, 9, 9
s Vel.	X 27·6	44 33	36·3	13·1	6, 6
t^2 Car.	X 34·9	58 40	19·9	14·7	5½, 7½
μ Arg.	X 42·5	48 54	57·7	2·5	4, 8
h. 4383	X 50·4	70 11	275·3	0·8	6·5, 8 [14]
h. 4409	XI 2·7	42 5	272·7	1·8	5·5, 8·5
η Car.	XI 8·3	59 46	275·3	21·7	5, 11
h. 4421	XI 11·2	47 22	69	12	6·5, 10
h. 4432	XI 19·0	64 24	294·6	2·3	6, 8
Δ 109	XI 23·8	42 7	167·3	13·3	6, 8·8
22 Hyd.	XI 31·6	33 1	245	4	6, 9
h. 4463	XI 35·6	33 1	248	2½	6, 8
3 Hydræ	XI 47·9	33 21	349·6	1·5	5, 5 [3]
ε Cham.	XI 54·6	77 40	179·6	1·6	6, 6
St. 6777	XII 4·9	34 9	20·8	3·1	6·5, 9·5
R. 14	XII 8·8	45 10	245·2	3·2	5, 7
h. 4518	XII 19·4	40 50	207·5	10·3	6·5, 9
α Crucis.	XII 21·0	62 32	117·3, 201·8	4·7, 89·8	2, 2, 6
γ Crucis.	XII 25·6	56 33	34·9	101·3	2, 5
γ Cent.	XII 36·0	48 25	359·1	1·7	4. 4
β Musc.	XII 40·1	67 34	317·3	0·5	4, 4·5 [15]
h. 4554	XII 46·4	30 32	28	18	6, 10
μ Crucis.	XII 48·7	56 38	17·4	34·3	5, 6
h. 4563	XII 54·6	33 5	237	7	7, 9
ξ^2 Cent.	XIII 1·1	49 23	100	26	5, 10
θ Musc.	XIII 1·6	64 47	184·0	5·2	7, 9
h. 4590	XIII 24·6	77 3	134·9	22·4	6, 10
Q Cent.	XIII 35·3	54 3	163·6	5·2	6, 7
k Cent.	XIII 46·0	32 30	113	9	6, 7
β 343	XIII 46·3	31 7	129·7	1·7	6·2, 7·1
h. Cent.	XIII 47·4	31 26	186	13·8	5, 10
β 1108	XIII 47·7	35 11	84·0	1·3	6, 6 [16]
Russel 223	XIII 49·8	53 39	348·5	1·0	5, 6
h. 4649	XIV 2·0	59 14	64·5	8·1	9, 9
h. 4672	XIV 13·9	42 36	303·5	3·6	4, 9

Name.	R.A.	Dec. S.	Pos.	Dist.	Mags.
	h. m.	° ′	°	″	
Y Cent.	XIV 15·4	58 1	159·4, 1·3	9·5, 45·3	5·5, 8, 10
β 1112	XIV 27·2	30 16	7·6	2·4	6·3, 11·1
h. 4690	XIV 30·8	45 42	23·6	20	6½, 9½
α Cent.	XIV 32·8	60 25	205·0	18·6	1, 2[17]
α Circ.	XIV 33·4	64 33	244	16	4. 9
β 414	XIV 35·9	30 30	345·6	1·0	6·5, 7·9
β 347	XIV 48·5	32 54	320·6	13·0	6·5, 10·5
h. 4715	XIV 49·6	47 29	275·9	2·3	7, 8
π Lup.	XIV 58·3	46 40	86·3	1·5	5, 5[18]
h. 4734	XV 3·8	54 58	244·8	11·3	5·5, 11
κ Lup.	XV 5·0	48 22	144·2	26·9	5, 8
h. 4746	XV 7·6	58 42	—	—	Mult.[19]
β 350	XV 9·7	27 14	157·7	1·3	6·5, 8[5]
μ^{1} Lup.	XV 11·6	47 31	129·5, 163·8	22·2, 1·8	6, 8, 6
γ Circ.	XV 15·4	58 58	91·9	0·6	5, 6
ε Lup.	XV 15·9	44 20	175	26	4, 9·5
γ Lup.	XV 28·5	40 50	94	0·7	4·4[20]
d Lup.	XV 29·0	44 37	356·1	2·0	5, 8
h. 4806	XV 45·0	54 45	18·5	21·4	6·5, 9·5
h. 4813	XV 47·2	59 52	99·2	3·2	6·5, 9·2
ξ Lup.	XV 50·5	33 41	49	11	6, 6
η Lup.	XV 53·5	38 7	21·0	7·1	4, 8
12 Scorp.	XVI 6·1	28 10	82	4·6	6·5, 10
δ Trian. Russel 270	XVI 6·3	63 26	140	0·3	3, 11
h. 4848	XVI 17·5	32 58	155	6	7, 7
h. 4850	XVI 18·4	29 28	352·1	6·9	6·5, 7[4]
ι Trian. Russel 278	XVI 18·6	63 50	20·5	21·6	5·5, 9
ε Norm.	XVI 19·8	47 20	335·8	22·7	5, 7
h. 4866	XVI 31·4	56 48	124·4	3·4	7, 8
h. 4876	XVI 33·8	48 35	265	10	6, 7[21]
h. 4889	XVI 44·3	37 20	7·7	6·5	6, 9
h. 4901	XVI 52·4	58 42	131·6	3·2	8, 8
Δ 214	XVII 3·1	67 4	340·9	27·9	6, 9
β 416	XVII 12·1	34 53	224·4	1·8	6, 8·5[22]
γ Aræ.	XVII 16·9	56 17	328·5	16·8	3, 12
h. 4949	XVII 19·5	45 45	262·7	2·3	7, 7·5
β 128	XVII 20·6	26 15	328 0	4·0	7·7, 10·3
h. 4962	XVII 28·2	32 31	102	8	6·5, 13, mult.
h. 5003	XVII 52·7	30 15	105·1	4·8	6, 7
h. 5014	XVII 59·6	43 26	73·0	1·3	7, 7
β 245	XVIII 3·6	30 45	355	3·5	6, 10
β 285 Quadruple	XVIII 10·7	25 3	315·7 20·7	1·7 1·6	8·8, 9·7 9·5, 10·5

Name.	R.A.	Dec. S.	Pos.	Dist.	Mags.
	h. m.	° ′	°	″	
η Sag. (β 760)	XVIII 10·9	36 48	107·0	3·5	4·2, 11·4
h. 5041	XVIII 17·7	53 42	264·9	1·8	7, 10
β 133	XVIII 21·5	26 42	265·3	1·8	7·5, 7·5 [23]
β 1128	XVIII 24·5	33 4	198·6	3·2	6·1, 11·5
κ Coron. Aust.	XVIII 26·5	38 48	359	22	6, 7
Russel 308	XVIII 37·4	73 6	260·3	1·0	6, 10
h. 5066	XVIII 44·0	41 11	86·5	9·3	6, 10
ζ Sag.	XVIII 56·3	30 1	251·1	0·8	4, 5 [24]
γ Coron.	XVIII 59·7	37 12	176·9	1·7	6, 6 [25]
h. 5093	XIX 6·5	43 15	220, 214	20, 10	8, 10, 11
β^1 Sag.	XIX 15·5	44 39	78·5	27·8	5, 7
Δ 227	XIX 44·7	55 15	147·5	22·7	6, 7
κ^2 Sag. (β 763)	XX 17·1	42 45	211·2	1·3	6, 8·9
β 153	XX 41·4	26 47	286·0	1·6	7·7, 9
R 26	XX 43·3	62 48	95·2	2·8	$6\frac{1}{2}$, $6\frac{1}{2}$
α Micr.	XX 43·7	34 9	165·5	20·0	5, 9
β 251	XXI 6·1	31 0	234·4	2·1	8, 9·5
θ Ind.	XXI 12·7	53 52	289·5	3·7	5, 9
β 271	XXI 14·0	26 46	237·2	2·7	7, 10·4 [26]
θ^2 Micr. (β 766)	XXI 18·0	41 26	307·1	1·1	5, 7
β 767	XXI 20·6	42 59	143·1	3·1	6, 8
θ Pisc. Aust.	XXI 41·9	31 22	334	25	5, 13
η Pisc. Aust. (β 276)	XXI 55·1	28 56	113·3	1·2	5, 6
δ Touc.	XXII 20·2	65 29	284·9	6·7	$5\frac{1}{2}$, 9
β Pisc. Aust.	XXII 25·8	32 52	173	29	4, 8
σ^2 Gruis. (β771)	XXII 30·6	41 6	270	1·3	6, 10·5
h. 5356	XXII 34·2	28 51	160, 58	85, 4	6, 7, 9
Δ 246	XXIII 1·5	51 14	260	8	6, 7
θ Gruis. Jacob 238	XXIII 1·3	50 51	26·1	2·1	5·2, 8·7 [27]
h. 5394	XXIII 15·2	44 4	209·9	16·2	5·7, 9
ψ Gruis.	XXIII 18·2	54 22	213	27	6, 7
θ Phoen.	XXIII 34·1	47 12	269	4	6, 7
δ Sculp. (β 1013)	XXIII 43·7	28 41	228·9	3·3	4·7, 12·5

[1] Triple, 11 ms.—[2] Tebbutt, 227°·1 : 7″·1, '90. Bin. Per., 302·37 yrs. Gore.—[3] β's measures.—[4] Cin. measures.—[5] Ha. Bin.—[6] 7 very high red.—[7] Bin. Tebbutt, 22°·2 : 1″·8, '87.—[8] 11 : 301° : 21″.—[9] Tebbutt, 85·1, '87. Bin.—[10] Quadruple.—[11] 11 : 37°·7 : 39″·2.—[12] W., rich ruby.—[13] Distant 8.—[14] '71. 283°·1 : 1″·1, '79. Bin.?—[15] Discov. at Sydney. Tebbutt, 329°·3 : 1″·3, 88. Bin.—[16] 12 ms. 168°·2 : 27″·5, and distant 8·5.—[17] Tebbutt, '90. Bin. Per., 61·88 yrs. Gore. Nearest to us yet known.—[18] Tebbutt, '88. Bin.—[19] 10 or more, 12–13 ms. within 45′ of 8 ms. Rare.—[20] Sydney. Elong.? '86; round, '87.—[21] Quadruple.—[22] '77. β, 24°·4 : 0″·6, '92. Rapid Bin. 12 ms., 129°·4 : 30″.—[23] Schi.—[24] β, '91. Discov. by Winlock. Bin. Per., 18·69 yrs. Gore.—[25] β, '91. Bin. Per., 154·41 yrs. Gore.—[26] Bin., with large p.m.—[27] β, '91.

(B) STARS WITH REMARKABLE SPECTRA.

Abbreviations:—E., *Ellery*.—P., *Pechüle*.— H., *From photos taken by Messrs. Bailey at Peru*.—C., *Copeland*.—F., *Hydrogen line* F *bright*.

Name.	R.A.	S. Dec.	Mag.	Type.	Discoverer.
	h. m.	° ′			
Es-Birm. 67	III 10·0	57 46	6·3	III (IV ?)	P.
Es-Birm. 154	V 40·4	46 30	7½	IV	P.
—	VII 14·8	36 33	5·3	F	H.
Es-Birm. 256	VII 53·5	49 43	8	IV	P.
γ Vel.	VIII 6·4	47 1	Var.	F	Respighi
—	VIII 9·7	35 35	5·3	F	H.
—	VIII 51·6	47 12	8·8	V	C.
Es-Birm. 304	IX 51·3	41 7	7·5	IV	P.
Es-Birm. 305	IX 57·9	59 49	7½	IV	P.
Es-Birm. 307	X 7·5	34 50	7½	IV	P.
—	X 7·6	60 8	—	V	H.
—	X 13·3	57 24	—	V	H.
Es-Birm. 311	X 30·8	39 4	6·5	IV	P.
—	X 37·5	59 9	7½	V	H.
—	X 37·6	38 13	9·8	V	C.
—	X 40·0	59 35	6·9	V	H.
—	X 40·3	59 12	8½	V	H.
η Argûs	X 41·2	59 9	Var.	F, etc.	Le Sueur.
—	X 43·4	58 41	—	V	H.
—	X 47·9	61 40	—	V	H.
—	X 52·0	59 51	8½	V	H.
—	X 55·8	57 17	—	V	H.
—	XI 0·8	65 1	8½	V	H.
—	XI 2·3	64 58	8½	V	H.
—	XI 6·0	60 26	9	V	C.
—	XI 55·2	54 33	—	V	H.
δ Cent.	XII 3·2	50 5	2·8	F	H.
γ Gruis.	XII 25·6	56 33	2·0	III	E.
—	XII 56·3	70 56	6·6	F	H.
θ Musc.	XIII 1·6	64 46	6	F	H.
—	XIII 24·3	61 34	—	V	H.
—	XIII 36·3	66 50	—	V	H.
μ Cent.	XIII 43·6	41 8	3·4	F	H.
—	XIII 46·8	66 2	—	V	C.
—	XIII 47·7	46 39	6·6	F	H.
—	XIII 51·6	55 51	8	IV	H.
—	XIV 29·2	41 43	2·5	F	H.
σ Libræ.	XIV 58·3	24 53	3·5	III	E.
Es-Birm. 422	XV 4·8	69 42	6·2	IV	H.
—	XV 15·9	62 20	—	V	H.

Name.	R.A.	S. Dec.	Mag.	Type.	Discoverer.
	h. m.	° ′			
—	XV 55·0	62 28	—	V	H.
—	XVI 44·5	41 3	5·9	V	H.
—	XVI 45·3	41 41	7½	V	H.
—	XVI 47·3	41 40	7½	V	C.
—	XVI 48·0	40 59	6·4	V	H.
—	XVI 57·1	38 0	6·5	V	H.
—	XVI 57·2	37 42	7·1	V	H
—	XVII 12·1	45 31	7½	V	H.
—	XVII 55·1	32 42	9	V	H.
η Sagitt.	XVIII 10·9	36 47	3·3	III	E.
—	XXI 13·6	45 27	6	IV	H.
π^1 Gruis.	XXII 16·6	46 27	6·7	IV	H.
δ^2 Gruis.	XXII 23·8	54 14	4·4	III	E.
β Gruis.	XXII 36·7	47 4	2·2	III	P.

(C) KNOWN VARIABLE STARS.

Name.	R.A.	S. Dec.	Var.	Per.	Discoverer.
	h. m.	° ′		Days.	
R Sculpt.	I 22·4	33 3	5·7 to 7·6–8	207·5	Gould
—	II 49·7	50 21	6·2–9·7	?	Fleming
R Retic.	IV 32·5	63 14	7 below 13	280	Ragoona-thachari
R Dorad.	IV 35·6	62 16	5·7 to 6·7	?	Gould
—	IV 36·2	38 29	7·5 to 10·5	?	Fleming
—	V 56·8	86 26	7·4 below 11·3	?	Fleming
L^2 Puppis	VII 10·5	44 29	3·5 to 6·3	136·5	Gould
S Puppis	VII 43·8	47 52	7·2 to 9	?	Gould
V Puppis	VII 55·4	48 58	4·4 to 5·2	4½?	Williams
—	VIII 29·2	58 44	7·2 to 8	6·66	Roberts
—	VIII 34·4	47 1	7·5 to 8·5	4·6	Roberts
—	IX 19·6	55 32	7·5 to 8·5	4·38	Roberts
N Velor	IX 28·2	56 36	3·4 to 4·4	4·25	Gould
R Car.	IX 29·7	62 21	4·3–5·7 to 9·3–10	311·5	Gould
l Car.	IX 42·5	62 3	3·7 to 5·2	35·05	Gould
R Ant.	X 5·5	37 14	6·5 below 8	?	Gould
S Car.	X 6·2	61 4	6 to 9–9·2	148·7	Gould
η Arg.	X 41·2	59 9	Above 1 to 7·4	Irreg.	Burchell

Name.	R.A.	S. Dec.	Var.	Per.	Discoverer.
	h. m.	° ′		Days.	
T Car.	x 51·3	59 54	6·2 to 6·9	18 h.?	Gould
—	x 53·8	58 41	6·7 to 8·5	38·6	Roberts
—	xii 7·4	69 36	6·5 to 7 3	9·66	Roberts
—	xii 18·0	60 58	6·8 to 8	5·827	Roberts
—	xii 19·2	48 53	6 to?	?	Pickering
R Muscæ.	xii 36·0	68 51	6·6 to 7·4	0·882253	Gould
—	xii 48·4	57 53	6·8 to 7·6	4·84	Roberts
R Cent.	xiv 9·4	59 27	6-6·3 to 8 7–9 8	160·5	Gould
R Apod.	xiv 46·5	76 15	5·5 to 6·2	?	Gould
T Tri. Aust.	xv 0·4	68 20	6·9 to 7·4	0·98	Gould
R Tri. Aust.	xv 10·8	66 8	6·6–6·8 to 7·5–8	3·38922	Gould
R Lupi	xv 47·0	36 0	9 below 11	?	Gould
S Tri. Aust.	xv 52·2	63 29	6·5 to 7·5	6·3	Gould
—	xvi 9·4	57 41	6·5 to 7·4	9·75	Roberts
—	xvi 31·4	56 48	6·9 to 8	4·422	Roberts
—	xvi 48·4	44 57	7 to 11·4	?	Fleming
—	xvii 25·9	86 46	8·2 below 11·7	?	Fleming
κ Pav.	xviii 46·6	67 21	4 to 5·5	9·102	Thome
S Cor. Aust.	xviii 54·4	37 5	9·5 to 13	?	Schmidt
R Cor. Aust.	xviii 55·1	37 6	9·8–11·5 to 13·2	30·6	Schmidt
T Cor. Aust.	xviii 55·2	37 6	9·8 to 13	?	Schmidt
—	xix 51·8	42 7	8 below 12·6	?	Fleming
—	xx 9·4	39 29	7·7 to 10·7	?	Fleming
S Pisc. Aust.	xxi 58·0	28 32	8·7–9·2 below 11	272	Weiss
R Pisc. Aust.	xxii 12·3	30 6	5·7? below 11?	?	Gould
R Indi.	xxii 28·9	67 48	9? 11?	?	Gould
R Phœn.	xxiii 51·3	50 21	8·5? 11?	?	Gould

NOTES.

η Argûs, whose changes have attracted so much attention of late years. 1677, 4 ms.; 1751, 2 ms.; 1811–15, 4 ms.; 1822–26, 2 ms.; 1827, 1 ms.; 1828–33, 2 ms.; 1838–43, 1 ms.; 1843–50, nearly or quite equal to Sirius, with some strange fluctuations, 1845–48. Last to nearly all eyes, 1862, or as others, 1864. 5 ms. 1865. 6·8, 1892 (Roberts). Wolf thinks a period possible of 46 yrs., with two subordinate *maxima* and *minima*. Loomis prefers 70 yrs. Red, or or. red. Le Sueur, with the great Melbourne refl., finds its spectrum crossed by bright lines.

This star was seen by h., 1838, encompassed by dense nebulosity. 1860–62, Powell noticed it much fainter, and changed in form. Ellery, with Melbourne refl., finds a very rapid change. Gill and others have photographed it.

(190 Argûs, about VII^h 34^m, 37° 30′, is mentioned by Freeman as a singularly red star in a fine field.)

Canopus was thought, 1861, in Chili, brighter than Sirius. (*Astron. Nachr.*, 1311.)

ε Crucis. Lettsom, 1860, found this star 6 ms. instead of 4 ms., as in Map Houzeau, 1875, 4·5 ms.

(D) CLUSTERS AND NEBULÆ.

The two Magellanic Clouds, or Nebecula Major and Minor, are of the most complex nature: large tracts of nebulosity, irresolvable, and in every stage of resolution, with clustering groups, nebulæ of all kinds, globular clusters, and nebulous objects of unique character. The N. Major contains 278 clusters and nebulæ, with 50 or 60 outliers; the Minor 37, with 6 adjacent. They combine what are elsewhere strikingly separated, the galactic and the nebular system.

The Galaxy from Centaurus to Argo was all resolvable on a dark ground with h.'s 18½-inch specula, front view.

The numbers in the following list are those of the new 'General Catalogue.' A few of them might be seen in our latitudes.

No.	R.A.	Dec. S.	h.'s Description.
	h. m.	° ′	
104	0 19·6	72 39	Most glorious globular cluster; stupendous object; completely insulated; stars all nearly 12–14 m^g. Central blaze ruddy, rest white. 47 Toucani, *p Nubec. Minor.*
253	0 42·6	25 50	Very bright large neb. 24′ × 3′.
288	0 47·8	27 8	Bright cl. 5′ diam. 12–16 m^g.
292	0 48·0	73 54	Centre of *Nubec. Minor*, a partially resolved cloud, 11–18 m^g. in a most barren region.
330	0 52·8	73 1	Bright knot of 13–15 m^g. stars.
362	0 58·9	71 23	Cl. 13–14 m^g.; central blaze.
613	1 29·6	29 55	Bright large neb.
1316	III 18·9	37 35	Bright neb.; stellar nucleus, 2″. (Another 7′ *n.*)
1365	III 29 8	35 28	Very bright nucleus, resolvable? between two lengthened parallel clouds of haze.
1387	III 33·1	35 51	Bright cl.
1399	III 34·6	35 47	Ditto, resolved?
1436	III 39·6	36 26	Bright cl.
1512	IV 0·6	43 38	Cl. just *n* of great group of large stars, 6–8 m^g.
1763	IV 56·6	66 33	Bright large neb. (Many of the following, to 1350, are in *Nub. Maj.*)
1792	V 1 8	38 8	Ditto, resolvable?
1818	V 4·1	66 34	Bright cl.
1820	V 4·3	67 24	Cl. in radiating streaks.
1850	V 9·2	68 53	Fine large cl. 13 m^g.
1851	V 10·8	40 9	Superb cl. 14–16 m^g.; central blaze.
1855	V 9·9	68 57	Bright cl. 12 m^g.
1859	V 13·9	67 29	Large cl.
1901	V 17·9	68 42	Ditto.
1978	V 28·5	66 18	Large oval neb.
2004	V 30·8	67 21	Cl. 12–14 m^g.
2027	V 35·0	66 59	Large cl. 9–11 m^g.

No.	R.A.	Dec. S.	h.'s Description.
	h. m.	° ′	
2070	v 39·4	69 9	'Great looped neb.' round 30 Doradûs, in *Nub. Maj.*, visible to naked eye: Le Sueur, gaseous. Burton, continuous spectrum with one bright line. Change?
2100	v 42·9	6 15	Cl. 13–16 m^g.
2132	v 53·9	59 56	Group of bright and smaller stars.
2157	v 58·3	69 12	Bright cl.
2220	vi 18·3	44 43	Cl. coarse, brilliant; chief, 8 m^g.
2409	vii 27·1	16 59	Brilliant group, 8–10 m^g.
2451	vii 41·7	37 44	Very large bright cl.; one 4·5 m^g., orange.
2477	vii 48·7	38 17	Beautiful large cl. 12 or 13 m^g.
2482	vii 50·7	24 2	Very rich milky-way cl. 10–12 m^g.
2516	vii 56·7	60 35	Large brilliant cl. 7–13 m^gs.; orange star in middle. Visible to naked eye.
2547	viii 7·7	48 58	Ditto, 7–16 m^g.
2792	ix 8·7	42 1	Plan. neb. 6″ diam., bright as 9 m^g.
2808	ix 10·0	64 27	Superb cl. 13–15 m^g., 'like the finest dust;' central blaze.
2818	ix 12·0	36 12	Cl. containing neb. nearly plan., like M. 46 (Argûs, *antea*).
2867	ix 18·6	57 53	Plan. neb., perfectly sharp and round; 8″; white.
2932	ix 31·6	46 30	Very large cl., from 8 m^g. 'Telescopic Præsepe.'
3114	ix 59·5	59 38	Very large, loose cl. 9–14 m^g.
3132	x 2·8	39 57	Plan. neb., large; elliptic; enclosing star 9 m^g.
3372	x 41·2	59 9	Great diffused branching milky neb. with interior darkness, about η Argûs [probably gaseous].
3532	xi 2·3	58 8	Glorious cl. 8–12 m^g. Most brilliant h. had ever seen.
3766	xi 31·5	61 3	Large cl. 8–13 m^g. 150 to 200 stars.
3909	xi 44·5	47 43	Ditto, 9–14 m^g.
			Plan. neb. 12″; beautiful rich blue; bright as 7 m^g. Or. 8 m^g. ± 10′ *n*.
4755	xii 47·7	59 48	Vivid and beautiful cl., 50 to 100 of various colours, some greenish, round κ Crucis, extremely red. Abbott (1862) suspected changes in number, position, and colour.
5045	xiii 10·5	62 53	Great milky-way cl. 34, 11 m^g. 150 or 200 smaller.
5139	xiii 20·8	46 47	'Most glorious object;' cl. of full 20′, thousands of stars of 2 m^g. 12 and 13 only (or 13 and 15); perhaps from optical

No.	R.A.	Dec. S.	h.'s Description.
	h. m.	° ′	
			coincidence; the larger like lace-work; two darker spaces in centre. Hazy 4 or 5 m^{g}. star to naked eye, ω Centauri.
5662	XIV 28·0	56 7	Bright cl. 9-13 m^{g}. 7 m^{g}. red or yellow, central.
5882	XV 10·0	45 17	Plan. neb., most elegant and delicate; perfectly sharp; 4″; white.
5925	XV 20·2	54 10	Cl. 11-14 m^{g}., in pairs and small groups, on a black ground.
6025	XV 55·2	45 17	Brilliant cl. from 7 m^{g}.
6067	XVI 5·4	53 57	Superb cl. 20′; 10-15 m^{g}.
6087	XVI 10·6	57 39	Coarse brilliant cl. 7-10 m^{g}.
6124	XVI 18·7	40 26	Cl. 50 or 60, 9-11 m^{g}.
6388	XVII 29·0	44 40	Cl. 4′; 17-20 m^{g}., excessively close.
6405	XVII 33·6	32 9	M. 6. Cl. 7-10 m^{g}.
6441	XVII 43·4	37 2	Cl. 18-20 m^{g}., central blaze. γ Telesc. in field.
6475	XVII 47·3	34 47	M. 7? Brilliant cl. 60, 7-12 m^{g}.
6637	XVIII 24·8	32 25	M. 69. Cl. 14-16 m^{g}.
6681	XVIII 36·7	32 23	M. 70. Cl. 14-17 m^{g}.
6715	XVIII 48·7	30 36	M. 54. Cl. 15 m^{g}.
6809	XIX 33·7	31 11	M. 55. Cl 12-15 m^{g}.

APPENDIX III.

Note on the Distribution of Stars in Space.—It has lately been shown that the distribution of stars in space may be roughly explained by an ellipse of considerable excentricity within which a circle is described so that the circumference comes near to the ellipse at the Minor Axes. If then a series of ellipses be drawn between the circle and the first ellipse the distances between each ellipse will fairly represent the phenomena of distribution. The ends of the minor axes are the Galactic Poles, the major axis the Galactic Equator. The position of the sun is assumed to be within the circle, and is probably nearer the Cygnus-Sagittarius region, and so some way from the centre of the circle. The circle will then represent the solar stars of Type II, with large proper motions tolerably uniformly distributed over the heavens; the first ellipse will represent the

stars of Type III, where the density slightly increases towards the equator. The second ellipse the stars of Type II, with small proper motions, and whose spectra is not exactly solar; the third ellipse, which has much greater excentricity, will represent the stars of Type I, whose density thus becomes very great at the equator. The next the Nebulæ, and the outermost the stars of Type IV. The types must be considered as clustering between the ellipses, and the more distant the type the denser the cluster. The great clusters seem to consist mainly of stars of Type I. The nebulous region will be large and ill-defined at the equator, and from being nearer, separated into definite masses at the poles. The suggested form explains the commingling of Nebulous matter with stars of Type I. As to the sun's position in space, it has already been noted that it is moving towards Hercules (p. 131). Various facts point to it being much nearer this part of the heavens; for, supposing a distribution of stars, such as has been described above, we should naturally expect to find a greater extension of the Milky Way, and more perfect resolution at the nearest part to us. The mysterious V Type stars are found in this part of the Heavens, the sun's distance from the Auriga-Monoceros part of the Galaxy causing them to be too faint for detection with our present means. The numerous stars of Type IV in the Cygnus region probably point to the same conclusion. In the case of the Planetary Nebulæ, the three hours, XIX to XXI, have 13, while all the other twenty-one hours have only 11. The outburst of so many Temporary Stars in this region is probably rather explained by our proximity to it than from any local causes. Hitherto it has been usual to look upon these mysterious outbursts as miscarriages in the course of Nature; but here, as elsewhere, it may be that they are but the outcome of a slowly recurring law, of which we know nothing. Considering that modern Astronomy dates back only to Herschel I, and is but a hundred years old, it is not surprising that many things are still hid from us. It is indeed rather astonishing that we know as much as we do. Perhaps it may seem almost rash to speculate on so mighty a problem as the form of the Universe in the present state of our knowledge, but every grouping and collecting of facts is really helpful. Even if the conclusions drawn from them are erroneous, the facts remain. It is on the collection of facts, by patient and steady work, that the Astronomy of the future must depend, and as these last words are written in the last period of an eventful century, it may be permitted to point out that the great leaders of Astronomy in the past have been, as a rule, men who owned no great optical

means, but they had a zeal and enthusiasm and power of application which ensured, as it always will do, ultimate success. These pages, it is hoped, have at least been useful in showing how many lines of research are open to the amateur, and in placing problems before him, which, by steady work, he may be able to solve. Amongst these the form and structure of the Universe is the greatest problem, and whether the heavens be studied with a hand-glass, a mighty telescope, a camera, or spectroscope, diligence will certainly bring new facts to light. The lesson of the past is the lesson of the future, and that lesson is that very much more depends upon the man than upon the instrument he uses.

APPENDIX IV.

ADDITIONS AND CORRECTIONS.

VOL. I.

P. 175, *line* 19, 'At Devizes,' and *line* 24, 'Levander saw I, 1859,' are identical observations.

P. 193. The discovery by the Brothers Ball is a mistake.

P. 21, *for* 144 *read* 98.

Appendix II., *for* Miss Clark *read* Miss Clerke.

Celestial Photography and the Spectroscope.—A simple and effective camera, to screw into the eye-end of the telescope, has lately been brought out by Messrs. Horne and Thornthwaite, 416, Strand. It is fitted with shutter and double dark slide, and two photos can be taken on each plate. The price is 15*s.* The same firm are at present making the simple form of Spectroscope described on p. 22, with sliding arrangement to increase dispersion.

VOL. II.

Andromeda.—*Add* Σ 20. $0^h\ 12{\cdot}3^m$, N 15° 57′ : 8, 9 : 230°·1 : 12″·2 : 0.—*Add* Σ 179. $1^h\ 47{\cdot}3^m$, N 36° 50′ : 6·7, 7·7 : 160°·4 : 3″ 5 : w., '31. Fr., 7·7 : blsh., '76, *p.*, 56 And.

Argo.—9, p. 33, *β*, period, 23·3 yrs. Barnard, 282°·1 : 0″·4, '93.—*β* 208, p. 33, *β*, 52°·3 : 0″·7, '92. Bin.—*Add* Σ 1178. $VII^h\ 58{\cdot}7^m$, S 12° 55′ : 9, 9 : 330°·1 : 4″·8 : 0.

Auriga —P. 42. Huggin's finds the spectrum not that of a nebula.

Bootes.—β 612, p. 45. Glasenapp, per., 30·00 yrs.

Camelopardus.—Σ **455.** III^h 47·0^m, N 69° 13′ : 8·2, 8·7 : 167°·4 : 11″·9 : o.—Σ **604.** IV^h 48·9^m, N 69° 54′ : 8·1, 8·9 : 33°·9 : 2″·2 : w.—Σ **1720.** XII^h 58·8^m, N 83° 28′ : 8·4, 8·7 : 334°·6 : 1″·6 : v. w.

Cancer.—Σ **1297.** VIII^h 54·8^m, N 23° 7′ : 8·2, 9·3 : 162°·2 : 4″·7 : w., o.

Canes Venatici.—*Add* OΣ **269.** XIII^h 28·3^m, N 35° 25′ : 6·5, 7·0 : 218°·2 : o″·3, '44. β, 215° : o″·2, '92. Bin. β, per., 48·4 yrs. Gore, 47·7 yrs.—OΣ **285.** XIV^h 41·8^m, N 42° 48′ : 7·1, 7·6 : 76° : o″·6, '45. β, 162°·2 : o″·2, '92. Bin. β, per, 62·1 yrs. Gore, 118·57 yrs.

Canis Major.—Sirius, p. 62. β, per., 51·97 yrs.

Canis Minor.—*Add* OΣ **182.** VII^h 47·5^m, N 3° 39′ : 7, 7·5 : 47° : 1″·1.

Cassiopea.—*Add* OΣ **54.** III^h 22·6^m, N 67° 15′ : 7·2, 8·5 : 354°·5 : 25″·8.

Coma.—*Add* Σ **1652.** XII^h 27·5^m, N 21° 39′ : 9, 9 : 181°·9 : 6″ : o.

Cygnus.—Σ **2525,** p. 94, β, 328°·3 : o″·3, '92. Bin. Per., 138·54 yrs. Gore.—τ, p. 102, β, period, 36·5 yrs.—Es-Birm. 650, p. 103, is R X Cygni (var.).—Es-Birm. 673, p. 104, is R W Cygni (var.). *Add* Σ **2479.** XIX^h 6·3^m, N 55° 10′ : 7·1, 9·4 : 38° : 6″·7 : w., bl. De., doubles 7·1, *comes* 9·5 : *cuneo*, 40°·8, '63. β, 20°·2 : o″·7, '92. Bin. *Add* Σ **2607.** XIX^h 54·6^m, N 41° 59′ : 7 2, 9 : 293°·4 : 3″·2 : w., ash, '31. Orange, bl., 9-in. spec., '71; so Fr., '76. Heis, 6 m^g. De., 6·8, 8·3. OΣ, 7·2 double; *comes* 9 : 321°·9 : o″·4, '44. β, 306°·2 : o″·3, '90. Bin.?

Delphinus.—β, p. 107. β, 338°·7 : o″·5, '92.—*Add* Σ **2701.** XX^h 32·2^m, N 11° 42′ : 7·8, 8·2 : 218°·8 : 2″·1 : yw.

Draco.—*Add* Σ **2092.** XVI^h 37 7^m, N 60° 53′ : 7·7, 8·8 : 5°·9 : 8″ : w. Fixed.

Eridanus.—o^2, p. 118. β, period, 179·9 yrs.

Hercules.—μ, p. 132, *for* Leushner *read* Leuschner.—τ, p. 127, *for* 325°·3 *read* 145°·3.

Lynx.—Es-Birm. 292, p. 158, *for* VIII^h *read* IX^h. The star is in Ursa Major.

Lyra.—*Add* Σ **2328.** XVIII^h 25 6^m, N 29° 51′ : 8, 8·3 : 73° : 3″·4 : w.

Ophiuchus.—70, p. 174, β, period, 87·75 yrs.

Pegasus.—κ, p. 190, β, period, 11·37 yrs.—85, p. 194, Glasenapp, period, 17·48 yrs.—*Add* Σ **67.** O^h 46·9^m, N 10° 4′ : 8·3, 9 : 13° : 1″·6 : w.

Perseus.—20, p. 196, β, period, 27·7 yrs.—*Add* Σ **388.** III^h 21·4^m, N 50° 5′ : 8·2, 9·2 : 210° : 2″·9 : w.

Sagitta.—Es-Birm. 598, p. 206, *is* T Sagittæ.

Serpens.—*Add* ✕ **2023.** XVI^h 9·6^m, N 5° 47′ : 8, 9 : 235°·9 ; 1″·5 : ysh. *Add* ✕ **2027.** XVI^h 10·3^m, N 4° 31′ : 8·2, 8·2 : 75°·2 : 2″ : w.

Sextans.—8, p. 220, Glasenapp, per., 93·92 yrs. *Add* ✕ **1377.** IX^h 38 3^m, N 3° 6′ : 7·9, 11·1 : 142°·2 : 3″·3 : distance increasing.

Triangulum.—*Add* ✕ **219.** II^h 4·2^m, N 32° 52′ : 8·2, 9·0 : 181°·6 : 11″·4 : w.—*Add* ✕ **232.** II^h 8·9^m, N 29° 56′ : 7·5, 7·5 : 245°·5 : 6″·6 : v. w. Fixed.

Ursa Major.—*o*, p. 232, *β* failed to see *comes*, two trials, '92.—*Add* ✕ **1341.** IX^h 15·8^m, N 51° 2′ : 8·5, 8·5 : 267°·3 : 21″·1 : w.

Ursa Minor.—π^2, p. 240, *β*, 363°·6 : 0″·2, '92. Bin.

NEW VARIABLE STARS

Name.	R.A.	Decl.	Var.	Discoverer.
	h. m.	° ′		
— Andromedæ	0 17·1	N 26 25	——	Anderson.
V Orionis	V 0 8	N 3 58	8·8 to 12	Boss.
S Leporis	VI 1·6	S 24 11	6·7 to 7·5	Sawyer.
— Scorpii	XVI 50·3	S 30 26	——	At Harvard.
— Ophiuchi	XVII 14·5	N 1 37	8·5 to 12·5	At Harvard.[1]
— Vulpeculæ?	XIX 9·1	N 25 51	9·0 below 12	Es.
— Cygni	XIX 9·6	N 49 35	8·5?	Deichmüller.
— Aquilæ	XIX 10·0	S 7 13	——	Schwab.
— Lyræ	XIX 16·9	N 37 41	8·5? 9·5?	Es.[2]
— Aquilæ	XIX 46·5	N 4 13	9·5 to 12	At Harvard.
V Aquarii	XX 41·8	N 2 4	8·1 to 9·3	De Ball.
V Delphini	XX 43·2	N 18 58	9? to 12	At Harvard.
— Cygni	XX 47·4	N 45 50	9? to 10?	Wolf.
— Cygni	XX 48·5	N 46 57	9·1 to 13·5	Es.
W Cephei	XXII 32·6	N 57 54	7·3-8·3	Es.[3]

[1] Period, 348·4 days.—[2] Type IV.—[3] 7 days?

INDEX TO DOUBLE STARS WHICH HAVE NO LETTER OR NUMBER ASSIGNED BY BAYER OR FLAMSTEED.

INDEX TO THE STARS OF ES-BIRM.